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THE ELEMENTS OF THE EARTH'S MAGNETISM

AND

THEIR SECULAR CHANGES BETWEEN 1550 AND 1915

Dr. H. Fritsche

Translation of "DIE ELEMENTE DES ERDMAGNETISMUS und ihre saecularen Aenderungen wahrend des Zeitraumes 1550 bis 1915", Publication III, St. Petersburg, A. Yakobson, Printer, 1900, pp. 1-62

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16. Abstract

This article contains the result of an investigation about the magnetic agents outside of the Earth's surface as well as the Earth's magnetic elements for the epochs 1550, 1900, 1915. Finally, it contains the secular changes of the Earth's matnetic elements during the time interval 1550 - 1900.

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THE ELEMENTS OF THE EARTH'S MAGNETISM
and
Their Secular Changes between 1550 and 1915
PUBLICATION III

Dr. H. Fritsche#

CHAPTER 1

a. Influence of magnetically acting agents which could be located on the Earth's surface. /1*

I have published two papers with the following titles about determining the elements of the Earth's magnetism using the Gauss theory and observations:

I. Determination of the coefficients of the Gauss general theory of the Earth's magnetism for the year 1885 and about the relationship of the three Earth-magnetic elements, St. Petersburg, 1897.**

II. The elements of the Earth's magnetism for the epochs 1600, 1650, 1700, 1780, 1842 and 1885 and their secular changes, calculated with the coefficients of the Gauss "General Theory of the Earth's Magnetism", St. Petersburg, 1899, which was derived from all of the usable observations.***

In the following I will call the first of these papers "Publication I" and the second will be called "Publication II". The present paper, my third publication, about this topic is an addition: It contains the result of an investigation about the magnetic agents

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* Numbers in the margin indicate pagination of foreign text.
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outside of the Earth's surface as well as the Earth's magnetic elements for the epochs 1550, 1900, 1915. Finally, it contains the secular changes of the Earth's magnetic elements during the time interval 1550-1900.

Some scientists have spread the false belief that Gauss when setting up a general theory of the Earth's magnetism only considered the inner magnetic Earth's forces, which are located inside the Earth and that he ignored the effects of the agents acting outside of the Earth's surface (for example, in the atmosphere). For example, L. A. Bauer in the Terrestrial Magnetism Magazine of March 1899 on page 34 (he is the editor) "he (Gauss) supposed the entire magnetism was due to causes within the Earth's crust".

A. Schmidt also has the same opinion, for example, in the magazine "Terrestrial Magnetism" volume II, (December), 1897, page 150. Also D. W. Littlehales in the "Terrestrial Magnetism", March 1900 page 39" in his paper about a not-yet completed book "An Account of the Late Professor Adams' Determination of the Gaussian Magnetic Constants". The equation formulated by Adams not only includes the magnetic constants of the class that were determined by Gauss as due to forces residing inside of the Earth, but they also take into account those forces which depend on sources outside of the Earth. /2 The number of magnetic constants contained in them is 120 for the class resulting from exterior influences and 120 for the class resulting from interior influences, or 240 magnetic constants in all, in place of the 24 constants of the interior class that were previously determined by Gauss.

I congratulate on the determination of 240 constants (coefficients GH) of the theory, both from the now available material and the material to be available in the future! In this way, the theory would be reduced to simple interpolation. I have proven* that 46 coefficients GH of the theory are sufficient for representing the

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** cf. publication I page 27.

observations completely because they cause the magnetic anomalies which can be found everywhere on the Earth. This means a larger number of coefficients than 46 would not bring about any noticeable reduction in the distances between the theory and the observation. As we will see later on, all of the observations of the 19th Century are not sufficient for an exact calculation of only 46 coefficients of the theory for the inner and 46 coefficients for the outer forces.

In the journal "Terrestrial Magnetism", September 1889 page 211, the editor Bauer gave an angry reply to my already published papers about the use of the Gauss theory because I demonstrated that his discovery about the secular variation was erroneous and that I criticized his so-called friends. I am convinced that my difficult work will be applauded by the specialists. The opinion of a talkative young person such as Bauer does not mean anything to me because for four decades I have worked on the exact scientific contributions (my first astronomical paper about the planet 65 appeared in no. 1420 of the Astronomical News, June 3, 1863).

One can easily demonstrate that Gauss gave the required rules for determining the magnetic forces not just inside but outside of the Earth's surface as can be demonstrated from paragraphs 36-41 on pages 169-175 of his **theory**. I use these rules to calculate the coefficients GH of the theory for the inner and outer magnetic forces. First, I determined GH only from the (observed) components X and Y. Then I determined GH separately only from the (observed) vertical component Z. From the combination of both series of the GH, I calculated the values of the GH both for the inner and outer forces according to the rules given in Chapter 40. The flattening of the Earth was also considered, but it only has a small influence. I used the same combinations of the primitive equations which are used in Publication I page 13 and the following. Here I will give the final equation for the two epochs 1842 and 1885 because the earlier epochs 1780, 1700, etc., should not be considered because of the deficient observations. /3

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Formula (1)

gh only determined from X

Epoch 1885.	Epoch 1842.
$+11,471 g^{1,0} + 4,500 g^{1,0} + 1,394 g^{2,0} - 35,627 - 36,397 = 0$	$+14,366 g^{1,0} + 4,664 g^{1,0} + 0,970 g^{2,0} - 9,063 + 0,569 = 0$
$-0,556 g^{1,0} + 6,820 g^{1,0} + 1,834 g^{2,0} + 3,044 + 3,096 = 0$	$-0,830 g^{1,0} + 5,189 g^{1,0} + 0,766 g^{2,0} + 2,245 + 1,731 = 0$
$-0,241 g^{1,0} + 1,998 g^{1,0} + 3,128 g^{2,0} + 0,812 + 0,842 = 0$	$0 g^{1,0} - 0,003 g^{1,0} + 1,350 g^{2,0} + 0,248 + 0,187 = 0$

gh only determined from Z

Epoch 1885.	Epoch 1842.
$+20,860 g^{1,0} + 1,528 g^{1,0} + 1,298 g^{2,0} - 65,255 - 66,562 = 0$	$+16,238 g^{1,0} + 1,016 g^{1,0} - 0,103 g^{2,0} - 0,219 + 0,310 = 0$
$+1,464 g^{1,0} + 10,636 g^{1,0} + 1,226 g^{2,0} - 1,857 - 2,418 = 0$	$+2,796 g^{1,0} + 6,436 g^{1,0} + 0,423 g^{2,0} - 2,623 + 1,879 = 0$
$+0,660 g^{1,0} + 2,328 g^{1,0} + 1,902 g^{2,0} - 1,665 - 1,290 = 0$	$-0,180 g^{1,0} + 1,350 g^{1,0} + 2,000 g^{2,0} + 0,810 + 0,363 = 0$

gh only determined from X,Y

Epoch 1885		Epoch 1842	
g	h	g	h
$+22,384 g^{1,1} + 0,644 g^{2,1} - 0,750 g^{3,1} - 5,476 + 13,411$		$-6,69 + 13,644 = 0$	
$-0,312 g^{1,1} + 12,301 g^{2,1} + 1,198 g^{3,1} - 3,707 - 1,628$		$-3,312 - 1,838 = 0$	
$-0,548 g^{1,1} - 0,246 g^{2,1} + 3,984 g^{3,1} + 1,642 - 1,758$		$+1,978 - 1,256 = 0.$	

Epoch 1885		Epoch 1842	
g	h	g	h
$+18,987 g^{2,1} + 1,341 g^{4,1} - 0,646 g^{6,1} + 9,612 - 2,389$		$+2,364 - 0,391 = 0$	
$+0,260 g^{2,1} + 6,722 g^{4,1} + 0,716 g^{6,1} + 2,174 + 0,834$		$+2,221 + 0,488 = 0$	
$+0,063 g^{2,1} + 0,937 g^{4,1} + 2,890 g^{6,1} + 0,674 + 0,670$		$+0,643 + 0,326 = 0$	

gh only determined from Z

Epoch 1885		Epoch 1842	
g	h	g	h
$+20,798 g^{1,1} + 3,010 g^{3,1} - 0,012 g^{5,1} - 6,476 + 12,107$		$-6,729 + 11,680 = 0$	
$0 g^{1,1} + 11,196 g^{3,1} + 1,400 g^{5,1} - 4,556 - 1,939$		$-3,517 - 1,891 = 0$	
$-0,284 g^{1,1} + 1,372 g^{3,1} + 3,274 g^{5,1} + 0,030 - 2,121$		$+0,658 - 1,368 = 0$	

Epoch 1885		Epoch 1842	
g	h	g	h
$+14,058 g^{2,1} - 0,360 g^{4,1} + 0,052 g^{6,1} + 6,986 - 1,900$		$+6,586 - 0,387 = 0$	
$0 g^{2,1} + 7,090 g^{4,1} + 0,898 g^{6,1} + 2,529 + 1,324$		$+2,833 + 0,315 = 0$	
$0 g^{2,1} \quad 0 g^{4,1} + 2,276 g^{6,1} + 0,525 + 0,381$		$+0,310 - 0,075 = 0$	

gh only determined from X,Y

Epoch 1885		Epoch 1842	
g	h	g	h
$+22,856 g^{2,2} + 1,040 g^{4,2} - 0,083 g^{6,2} + 1,783 + 3,374$		$+0,416 + 3,079 = 0$	
$-0,742 g^{2,2} + 10,700 g^{4,2} + 0,571 g^{6,2} + 2,328 - 0,612$		$+1,845 - 1,021 = 0$	
$-0,288 g^{2,2} + 0,350 g^{4,2} + 3,439 g^{6,2} + 0,117 + 0,128$		$-0,144 - 0,028 = 0$	

Epoch 1885		Epoch 1842	
g	h	g	h
$+16,485 g^{3,2} - 0,067 g^{5,2} + 4,179 + 0,156$		$+4,126 + 0,618 = 0$	
$+0,531 g^{3,2} + 6,449 g^{5,2} + 1,596 + 0,043$		$+2,011 + 0,036 = 0.$	

gh only determined from Z

Epoch 1885		Epoch 1842	
g	h	g	h
$+22,136 g^{2,2} + 0,354 g^{4,2} - 0,490 g^{6,2} + 1,552 + 2,743$		$+0,218 + 2,620 = 0$	
$+0,884 g^{2,2} + 7,064 g^{4,2} + 0,344 g^{6,2} + 1,410 - 0,419$		$+0,981 - 0,623 = 0$	
$+0,182 g^{2,2} + 0,248 g^{4,2} + 2,810 g^{6,2} - 0,226 + 0,496$		$-0,343 + 0,085 = 0.$	

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gh only determined from Z

Epoch 1885 g h	Epoch 1842 g h	
$+14,046 g^{1,2}$	$+0,6389 g^{1,2}$	$+4,086 -0,131 \quad +4,165 +0,621 = 0$
$-1,620 g^{2,2}$	$+4,342 g^{2,2}$	$+0,227 -0,383 \quad +0,939 +0,244 = 0$

gh only determined from X,Y

Epoch 1885 g h	Epoch 1842 g h		Epoch 1885 g h	Epoch 1842 g h	
$+17,000 g^{1,1}$	$+0,2757 g^{1,1}$	$-1,016 -0,718 -0,663 -0,697 = 0$	$+14,984 g^{2,1}$	$+0,4397 g^{2,1}$	$+1,086 +0,581 +0,528 +2,192 = 0$
$+0,2979 g^{1,1}$	$+4,565 g^{1,1}$	$-0,587 -0,342 -0,728 -0,162 = 0$	$-2,316 g^{2,1}$	$+5,583 g^{2,1}$	$+0,210 -0,132 +0,079 -0,437 = 0$

gh only determined from Z

Epoch 1885 g h	Epoch 1842 g h		Epoch 1885 g h	Epoch 1842 g h	
$+26,268 g^{3,1}$	$+0,9859 g^{3,1}$	$+4,034 +1,625 +0,576 +1,872 = 0$	$+12,299 g^{4,1}$	$-0,1469 g^{4,1}$	$-0,765 -0,830 -0,245 -0,564 = 0$
$+0,5969 g^{3,1}$	$+7,149 g^{3,1}$	$+0,328 +0,198 -0,048 -0,001 = 0$	$-0,0829 g^{4,1}$	$+2,908 g^{4,1}$	$-0,549 -0,236 -0,333 -0,238 = 0$

gh only determined from X,Y

Epoch 1885 g h	Epoch 1842 g h		Epoch 1885 g h	Epoch 1842 g h	
$+34,800 g^{3,2}$	$+0,3483 g^{3,2}$	$+0,321 -0,476 +0,052 -0,296 = 0$	$+15,249 g^{4,2}$	$-0,253$	$-0,222 -0,158 -0,287 = 0$
$+0,3449 g^{3,2}$	$+7,544 g^{3,2}$	$-0,184 -0,250 -0,145 -0,195 = 0$			

gh only determined from Z

Epoch 1885 g h	Epoch 1842 g h		Epoch 1885 g h	Epoch 1842 g h	
$+28,804 g^{3,3}$	$-0,2609 g^{3,3}$	$+0,080 -0,184 -0,061 -0,363 = 0$	$+12,108 g^{4,3}$	$-0,114$	$-0,139 -0,141 -0,101 = 0$
$-0,6349 g^{3,3}$	$+5,188 g^{3,3}$	$-0,069 -0,192 -0,038 +0,031 = 0$			

gh only determined from X,Y

Epoch 1885 g h	Epoch 1842 g h		Epoch 1885 g h	Epoch 1842 g h	
$+35,554 g^{3,4}$	$+0,220$	$+0,135 +0,152 +0,130 = 0$	$+17,133 g^{4,4}$	$+0,263$	$+0,250 +0,090 +0,139 = 0$

gh only determined from Z

Epoch 1885 g h	Epoch 1842 g h		Epoch 1885 g h	Epoch 1842 g h	
$+30,814 g^{3,4}$	$+0,203$	$+0,151 +0,351 +0,151 = 0$	$+13,160 g^{4,4}$	$-0,166$	$+0,317 +0,018 +0,375 = 0$

From this we obtain the following values for the coefficients gh,

Table (2). Epoch 1842.

	$g^{1,0}$	$g^{2,0}$	$g^{3,0}$	$g^{4,0}$	$g^{5,0}$	$g^{6,0}$
from X	+3,2452	−0,0016	−0,2214	−0,2936	+0,1229	−0,0826
" Z	+3,2097	−0,0007	−0,2088	−0,2928	−0,0556	+0,0161

	$g^{1,1}$	$g^{2,1}$	$g^{3,1}$	$g^{4,1}$	$g^{5,1}$	$g^{6,1}$	$h^{1,1}$	$h^{2,1}$	$h^{3,1}$	$h^{4,1}$	$h^{5,1}$
from X	+0,2750	−0,4760	+0,3230	−0,2395	−0,4379	−0,1350	−0,0447	+0,0220	+0,1188	−0,0648	+0,2389
" Z	+0,2713	−0,4777	+0,3513	−0,1824	−0,2379	−0,1362	−0,5825	+0,0262	+0,1413	−0,0487	+0,2163

	$h^{6,1}$	$g^{1,2}$	$g^{2,2}$	$g^{3,2}$	$g^{4,2}$	$g^{5,2}$	$g^{6,2}$	$h^{1,2}$	$h^{2,2}$	$h^{3,2}$	$h^{4,2}$	$h^{5,2}$
from X	−0,0928	−0,0078	−0,2515	−0,1777	−0,2911	+0,0818	−0,1100	−0,0375	+0,0591	−0,0025	−0,0253	
" Z	+0,0330	−0,0045	−0,2825	−0,1449	−0,3077	+0,1552	−0,1208	−0,0411	+0,1057	−0,0684	−0,0318	

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TABLE (2) Epoch 1842.

from		$g^{2,3}$	$g^{4,3}$	$g^{6,3}$	$g^{8,3}$	$h^{2,3}$	$h^{4,3}$	$h^{6,3}$	$h^{8,3}$	$g^{2,4}$	$g^{6,4}$	$g^{8,4}$
"	X	-0,0163	+0,0365	-0,0123	+0,1571	-0,0689	+0,0405	+0,0292	+0,0329	-0,0019	+0,0104	+0,0194
"	Z	-0,0222	+0,0213	+0,0086	+0,1152	-0,0707	+0,0470	+0,0160	+0,0832	+0,0023	+0,0116	+0,0192
		$h^{4,4}$	$h^{6,4}$	$h^{8,4}$	$g^{2,5}$	$g^{4,5}$	$h^{2,5}$	$h^{4,5}$				
"	X	+0,0083	+0,0188	+0,0249	-0,0043	-0,0052	-0,0037	-0,0080				
"	Z	+0,0126	+0,0083	-0,0043	-0,0114	-0,0044	-0,0049	-0,0185				

TABLE (3). Epoch 1885.

		$g^{1,0}$	$g^{3,0}$	$g^{5,0}$	$g^{7,0}$	$g^{9,0}$	$g^{6,0}$					
"	X	+3,1774	+0,0705	-0,2214	-0,3715	+0,1266	-0,1380					
"	Z	+3,1419	+0,0385	-0,2691	-0,4164	+0,0971	-0,1205					
		$g^{1,1}$	$g^{3,1}$	$g^{5,1}$	$g^{7,1}$	$g^{9,1}$	$g^{4,1}$	$h^{1,1}$	$h^{3,1}$	$h^{5,1}$	$h^{7,1}$	$h^{9,1}$
"	X	+0,2227	-0,4901	+0,3421	-0,2904	-0,3402	-0,1284	-0,5892	+0,1266	+0,0818	-0,1076	+0,3653
"	Z	+0,2475	-0,5045	+0,4305	-0,3276	-0,1891	-0,2307	-0,6001	+0,1315	+0,1232	-0,1656	+0,3997
		$h^{9,1}$	$g^{2,2}$	$g^{4,2}$	$g^{6,2}$	$g^{8,2}$	$g^{9,2}$	$h^{2,2}$	$h^{4,2}$	$h^{6,2}$	$h^{8,2}$	$h^{9,2}$
"	X	-0,1998	-0,0537	-0,2544	-0,2225	-0,2265	+0,0226	-0,1190	-0,0095	+0,0521	-0,0053	-0,0582
"	Z	-0,1674	-0,0647	-0,2340	-0,1965	-0,1514	+0,1020	-0,1214	+0,0096	+0,0840	+0,0878	-0,1755
		$g^{3,3}$	$g^{5,3}$	$g^{7,3}$	$g^{9,3}$	$h^{3,3}$	$h^{5,3}$	$h^{7,3}$	$h^{9,3}$	$g^{6,4}$	$g^{8,4}$	$g^{9,4}$
"	X	-0,0335	+0,0577	-0,0303	+0,1248	-0,0695	+0,0411	+0,0018	+0,0722	-0,0095	+0,0166	+0,0254
"	Z	-0,0378	+0,0645	-0,0428	+0,1305	-0,0610	+0,0685	-0,0226	+0,0830	-0,0027	+0,0094	+0,0129
		$h^{6,4}$	$h^{8,4}$	$h^{9,4}$	$g^{7,5}$	$g^{9,5}$	$h^{7,5}$	$h^{9,5}$				
"	X	+0,0134	+0,0146	+0,0316	-0,0062	-0,0152	-0,0038	-0,0144				
"	Z	+0,0067	+0,0115	+0,0379	-0,0066	+0,0126	-0,0049	-0,0241				

If according to Gauss, one calls the potential divided by the Earth's radius R, $= P' + P'' + P''' + P^{IV} + P^{V} + P^{VI}$, and if one sets the term corresponding to the outer forces $= p' + p'' + p''' + p^{IV} + p^{V} + p^{VI}$, if $\pi_h' \pi_h'' \pi_h''' \pi_h^{IV} \pi_h^{V} \pi_h^{VI}$ which are only the sums derived from the (observed) horizontal components X, Y of the potential, divided by R, and if finally $P_v' P_v'' P_v''' P_v^{IV} P_v^{V} P_v^{VI}$ are the sums determined with the (observed) vertical component Z of the potential, divided by R, then one obtains formulas (4)

$$p' = \frac{1}{3}(\pi_h' - P_v'),\ p'' = \frac{1}{5}(\pi_h'' - P_v''),\ p''' = \frac{1}{7}(\pi_h''' - P_v'''),\ p^{IV} = \frac{1}{9}(\pi_h^{IV} - P_v^{IV}),$$
$$p^{V} = \frac{1}{11}(\pi_h^{V} - P_v^{V}),\ p^{VI} = \frac{1}{13}(\pi_h^{VI} - P_v^{VI}).$$

formula (5)

$$P' = \pi_h' - p',\ P'' = \pi_h'' - p'',\ P''' = \pi_h''' - p'''\ \text{etc.}$$

If one now subtracts the values g/2 in (2) and (3) from one another, then one obtains the differences d and d, which are given in the following table (6).

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According to the above equations, one then obtains the quantities /6
$p' p'' p'''$... and $\mathfrak{P}' \mathfrak{P}'' \mathfrak{P}'''$... and in this way, the coefficients g/2 of both the outer and inner forces of Table (6)

$\mathfrak{P}'$	$g^{1,0}$	$g^{1,1}$	$h^{1,1}$
1842	d +0,0355	+0,0037	−0,0222
1885	d_1 +0,0355	−0,0248	+0,0109
average	m +0,0355	−0,0105	−0,0056
$g_a\ h_a$	+0,0217	−0,0070	−0,0034 $= \frac{1}{f} \cdot m$ according to
$g_i\ h_i$	+3,1876	+0,2558	−0,5332 calculated $\mathfrak{P}' = \Pi_h' - p'$

$\mathfrak{P}''$	$g^{2,0}$	$g^{2,1}$	$h^{2,1}$	$g^{2,2}$	$h^{2,2}$
1842	d −0,0009	+0,0019	−0,0042	−0,0033	+0,0108
1885	d_1 +0,0320	+0,0144	−0,0049	+0,0110	+0,0101
average	m +0,0155	+0,0081	−0,0045	+0,0038	+0,0104
$g_a\ h_a$	+0,0093	+0,0043	−0,0027	+0,0023	+0,0062 $= \frac{1}{f} m_1$ according to
$g_i\ h_i$	+0,0251	−0,5879	+0,0770	−0,0330	−0,1207 cal. $\mathfrak{P}'' = \Pi_h'' - p''$

$\mathfrak{P}'''$	$g^{3,0}$	$g^{3,1}$	$h^{3,1}$	$g^{3,2}$	$h^{3,2}$	$g^{3,3}$	$h^{3,3}$
1842	d −0,0136	−0,0283	−0,0311	+0,0310	+0,0036	+0,0059	+0,0018
1885	d_1 +0,0477	−0,0884	−0,0444	+0,0256	−0,0191	+0,0043	+0,0115
average	m +0,0170	−0,0583	−0,0362	+0,0283	−0,0077	+0,0051	+0,0066
$g_a\ h_a$	+0,0097	−0,0333	−0,0207	+0,0173	−0,0044	+0,0029	+0,0038 $= \frac{1}{f} m$ according to
$g_i\ h_i$	−0,2316	+0,3653	+0,1170	−0,2703	−0,0191	−0,0278	−0,0630 cal. $\mathfrak{P}''' = \Pi_h''' - p'''$

$\mathfrak{P}^{IV}$	$g^{4,0}$	$g^{4,1}$	$h^{4,1}$	$g^{4,2}$	$h^{4,2}$	$g^{4,3}$	$h^{4,3}$	$g^{4,4}$	$h^{4,4}$
1842	d −0,0002	+0,0129	−0,0153	−0,0318	−0,0166	+0,0152	−0,0065	−0,0042	−0,0043
1885	d_1 +0,0389	+0,0172	+0,0588	−0,0260	−0,0319	−0,0068	−0,0274	−0,0068	+0,0067
average	m +0,0190	+0,0600	+0,0213	−0,0294	−0,0242	+0,0042	−0,0170	−0,0055	+0,0012
$g_a\ h_a$	+0,0106	+0,0333	+0,0118	−0,0163	−0,0134	+0,0023	−0,0094	−0,0031	+0,0007 $= \frac{1}{f} \cdot m$ according to
$g_i\ h_i$	−0,3461	−0,3283	−0,0376	−0,1838	+0,0340	+0,0448	+0,0502	−0,0026	+0,0101 cal. $\mathfrak{P}^{IV} = \Pi_h^{IV} - p^{IV}$

$\mathfrak{P}^{V}$	$g^{5,0}$	$g^{5,1}$	$h^{5,1}$	$g^{5,2}$	$h^{5,2}$	$g^{5,3}$	$h^{5,3}$	$g^{5,4}$	$h^{5,4}$	$g^{5,5}$	$h^{5,5}$
1842	d +0,1785	−0,1400	+0,0226	+0,0166	+0,0659	−0,0209	+0,0232	−0,0012	+0,0105	+0,0071	+0,0012
1885	d_1 +0,0295	−0,1711	−0,0394	−0,0751	−0,0937	+0,0125	+0,0244	+0,0072	+0,0031	+0,0004	+0,0011
average	m +0,1040	−0,1555	−0,0859	−0,0292	−0,0139	−0,0042	+0,0238	+0,0030	+0,0068	+0,0037	+0,0011
$g_a\ h_a$	+0,0567	−0,0848	−0,0032	−0,0159	−0,0076	−0,0023	+0,0130	+0,0016	+0,0037	+0,0020	+0,0006
$g_i\ h_i$	+0,0680	−0,3142	+0,3053	−0,2429	+0,0034	−0,0190	+0,0025	+0,0119	+0,0130	−0,0072	−0,0043

$\mathfrak{P}^{VI}$	$g^{6,0}$	$g^{6,1}$	$h^{6,1}$	$g^{6,2}$	$h^{6,2}$	$g^{6,3}$	$h^{6,3}$	$g^{6,4}$	$h^{6,4}$	$g^{6,5}$	$h^{6,5}$
1842	d −0,0987	+0,0212	−0,1258	−0,0446	+0,0065	+0,0419	−0,0503	+0,0002	+0,0292	−0,0038	+0,0205
1885	d_1 −0,0035	+0,1023	−0,0324	−0,0794	+0,1173	−0,0657	−0,0108	+0,0125	−0,0063	−0,0278	+0,0057
average	m −0,0541	+0,0617	−0,0791	−0,0629	+0,0619	−0,0119	−0,0305	+0,0063	+0,0114	−0,0158	+0,0151
$g_a\ h_a$	−0,0291	+0,0332	−0,0426	−0,0339	+0,0333	−0,0064	−0,0164	+0,0034	+0,0061	−0,0085	+0,0081
$g_i\ h_i$	−0,8772	−0,1549	−0,1037	+0,0196	−0,0750	+0,1474	+0,0689	+0,0190	+0,0221	−0,0017	−0,0193

There are more or less serious determination errors connected with the coefficients $g_a\ h_a$ of the outer forces. It seems that the first coefficient $g_a^{1,0}$ has the most certainty, which here was cal- /7
culated using the averages k_o and m_o of the parallel circles (for epoch 1842 from 12 equidistant values, for epoch 1885 from 24 equidistant values of X and Z), because k_o and m_o are determined somewhat

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more accurately from observations than the other coefficients k l m K L M of the series $X = \kappa_0 + \kappa_1 \cos\lambda + K_1 \sin\lambda + \kappa_2 \cos 2\lambda + \ldots$,

$Y = \lambda_0 + l_1 \cos\lambda + \lambda_1 \sin\lambda + l_2 \cos 2\lambda + \lambda_2 \sin 2\lambda + \ldots$, $Z = m_0 + m_1 \cos\lambda + M_1 \sin\lambda + m_2 \cos 2\lambda + \ldots$

This is also because $g^{1,0}$ is smaller by the same amount 0.0355 for both epochs 1842 and 1845 when determined from Z and from X. If one were only to consider the $g_a^{40} = +0.0237$, if one were to ignore all other external forces, then the outer magnetic force divided by the inner magnetic force would be at a ratio of 1:135. In order to establish the size of the outer forces and their ratios to the inner forces, at least approximately without a cumbersome calculation, on the average for the entire Earth, I have collected the primitive equations on page 13 in the following in Publication I in the following way by only considering the numerical values of the coefficients of gh, but not their sign. In this way, I obtained: formula (7) equations

$$
\begin{array}{ll}
(X)_0 & \pm 0{,}679\, g^{4,0} \pm 0{,}679\, g^{3,0} \pm 0{,}519\, g^{2,0} \pm 0{,}339\, g^{1,0} \pm 0{,}21\, g^{5,0} \pm 0{,}13\, g^{6,0} = \kappa_0 \\
(X)_1 & \pm 0{,}613\, g^{4,1} \pm 0{,}623\, g^{3,1} \pm 0{,}45\, g^{2,1} \pm 0{,}319\, g^{1,1} \pm 0{,}18\, g^{5,1} \pm 0{,}129\, g^{6,1} = \kappa_1 \,, = K_1 \\
(X)_2 & \pm 0{,}679\, g^{4,2} \pm 0{,}523\, g^{3,2} \pm 0{,}33\, g^{2,2} \pm 0{,}219\, g^{1,2} \pm 0{,}12\, g^{6,2} = \kappa_2 \,, = K_2 \\
(X)_3 & \pm 0{,}678\, g^{4,3} \pm 0{,}433\, g^{3,3} \pm 0{,}26\, g^{2,3} \pm 0{,}159\, g^{1,3} = \kappa_3 \,, = K_3 \\
(X)_4 & \pm 0{,}679\, g^{4,4} \pm 0{,}399\, g^{3,4} \pm 0{,}21\, g^{2,4} = \kappa_4 \,, = K_4 \\
(X)_5 & \pm 0{,}679\, g^{4,5} \pm 0{,}359\, g^{3,5} \pm \kappa_5 \,, = K_5
\end{array}
$$

The most likely values of $\kappa_0\ \kappa_1\ K_1\ \kappa_2\ K_2$ are obtained if one substitutes the numerical values of g and h in these equations and the square root is taken from the sum of the squares of the corresponding products. For example, $\kappa_1 = \sqrt{(0{,}613\, g^{4,1})^2 + (0{,}45\, g^{3,1})^2}$. The most likely values of the northern component X_a of the outer magnetic forces is, therefore, $X_a = \sqrt{\kappa_0^2 + (0{,}62)^2 (\kappa_1^2 + K_1^2 + \kappa_2^2 + K_2^2 + \kappa_3^2 + K_3^2 + \kappa_4^2 + K_4^2 + \kappa_5^2 + K_5^2)}$, because the average value of cos nX and sin n_λ is 0.62 according to the scheme that I derived. Therefore, for the outer forces we find $X_a = \pm 0{,}0296$, and for the inner forces the northern component is $X_i = \pm 2{,}2$, that is, $X_a : X_i = 1 : 74$.

In the same way as for X, from the primitive equations of Publication I page 13, etc., I derived the most likely quantities of the western Y and the vertical component Z for the outer forces.

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Formulas (8) equations

$$
\begin{aligned}
(y)_0 &\quad \pm 4{,}009^{40} \pm 0{,}619^{40} \pm 0{,}36\,9^{40} \pm 0{,}19\,9^{40} \pm 0{,}10\,9^{40} \pm 0{,}05\,9^{40} \zeta_0^2 = l_0^2 \\
(y)_2 &\quad \pm 1{,}34\,9^{42} \pm 0{,}67\,9^{42} \pm 0{,}35\,9^{42} \pm 0{,}19\,9^{42} \pm 0{,}10\,9^{42} \zeta_2 = l_2 \\
(y)_3 &\quad \pm 1{,}59\,9^{43} \pm 0{,}67\,9^{43} \pm 0{,}32\,9^{43} \pm 0{,}16\,9^{43} \zeta_3 = l_3 \\
(y)_4 &\quad \pm 1{,}80\,9^{44} \pm 0{,}67\,9^{44} \pm 0{,}29\,9^{44} \zeta_4 = l_4 \\
(y)_5 &\quad \pm 1{,}99\,9^{45} \pm 0{,}67\,9^{45} \zeta_5 = l_5
\end{aligned}
$$

After one has calculated $l_1\ \zeta_1\ l_2\ \zeta_2$ from the laws of probability theory mentioned above, one obtains the most likely contribution of the western component Y_a for the outer forces

$$y_a = 0{,}62\sqrt{\zeta_1^2 + \zeta_1^2 + l_2^2 + \zeta_2^2 + l_3^2 + \zeta_3^2 + l_4^2 + \zeta_4^2 + l_5^2 + \zeta_5^2} = \pm 0{,}0192\ ;$$

For the inner forces, we have $Y_1 = 0.5$ and, therefore, $y_a : y_i = 1:26$ According to Publication II page 103, on the average, we found by averaging over 17 parallel circles between the latitudes +60° and -80° that the first term l_0 of the series $y = l_0 + l_1 \cos\lambda + \zeta_1 \sin\lambda + l_2 \cos 2\lambda + \zeta_2 \sin 2\lambda + \cdots$ was not $= 0$ according to observations. Instead, for the two epochs 1842 and 1885 on the average, they were $= \pm 0{,}014$, so that $l_0 : y_i = 0{,}014 : 0{,}5 = 1:36$. . This means that l_0 is quite close to the quantity Y_a.

Formulas (9) equations

$$
\begin{aligned}
(Z)_0 &\quad \pm 1{,}23\,9^{40} \pm 0{,}96\,9^{40} \pm 0{,}63\,9^{40} \pm 0{,}39\,9^{40} \pm 0{,}24\,9^{40} \pm 0{,}13\,9^{40} = m_0 \\
(Z)_1 &\quad \pm 1{,}34\,9^{41} \pm 1{,}00\,9^{41} \pm 0{,}61\,9^{41} \pm 0{,}42\,9^{41} \pm 0{,}25\,9^{41} \pm 0{,}15\,9^{41} = m_1 \\
(Z)_2 &\quad \pm 1{,}59\,9^{42} \pm 0{,}89\,9^{42} \pm 0{,}52\,9^{42} \pm 0{,}30\,9^{42} \pm 0{,}18\,9^{42} = m_2 \\
(Z)_3 &\quad \pm 1{,}80\,9^{43} \pm 0{,}83\,9^{43} \pm 0{,}43\,9^{43} \pm 0{,}23\,9^{43} = m_3 \\
(Z)_4 &\quad \pm 1{,}99\,9^{44} \pm 1{,}80\,9^{44} \pm 0{,}38\,9^{44} = m_4 \\
(Z)_5 &\quad \pm 2{,}16\,9^{45} \pm 0{,}77\,9^{45} = m_5 .
\end{aligned}
$$

The most likely magnitude of the vertical component Z_a for the outer forces is $Z_a = \sqrt{m_0^2 + (0{,}62)^2 (m_1^2 + M_1^2 + m_2^2 + M_2^2 + \cdots + m_5^2 + M_5^2)} = \pm 0{,}0464$ For the inner forces, we have $Z_i = 4{,}2$, that is $Z_a : Z_i = 1:91$.

The entire force J_a of the outer agents is $= \sqrt{X_a^2 + Y_a^2 + Z_a^2}$. Therefore, $J_a = 0{,}0583$ and since the entire intensity of the inner agents $J_i = 4{,}8$ applies for the entire Earth, one finds that $J_a : J_i = 1:82$ The outer force, therefore, is only 1/82 of the inner force on the

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average. I would like to also note that the components X_i, Y_i, Z_i were also calculated according to the approximate method mentioned, by substituting the values gh of the inner forces in equations (7), (8) and (9). In this way, I obtained the same quantities $X_i = 2.2$, $Y_i = 0.5$, $Z_i = 4.2$ as I obtained earlier by complete calculation from 408 locations distributed uniformly over the entire Earth's surface. Therefore, the values $X_a = 0.0295$, $Y_a = 0.0192$ and $Z_a = 0.0464$ can be considered as approximately correct.

The calculation which I made according to the Gauss rule of both the inner and outer Earth magnetic forces for the two epochs 1842 and 1885 required no great effort, after I had made the first general calculation which is contained in Publications I and II. This means that also in this case, as in many other cases, one has to admire the ingenuity of Gauss, who always was able to grasp problems he dealt with very well and was able to solve them in a simple way as could nobody else. Here again, the path for determining the Earth's magnetism is not only theoretically correct, but it is also the most practical method because, at the present time, one does not have any more or better absolute measurements than he had in the middle of the 19th Century, even though the number of magnetic observatories and their means have substantially improved compared to earlier times.

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B. Earth magnetic elements for the epoch 1550

The values of the coefficients g,h of the theory for the epoch 1550 are based on the declinations collected by Dr. Van Bemmelen and published in 1897, March 10, by the Academy of Sciences in Amsterdam, as well as the elements which I calculated earlier for the epoch 1600. Using these gh, I calculated the cosine and the sine series for determining the northern component X_r, the western component Y_r and the vertical component Z_r given in Tables (10), (11) and (12). And from this I calculated the seven elements $X_r, Y_r, Z_r, H_r, D_r, F_r, I_r$* contained in Tables (13), (14), (15), (16), (17), (18) and (19).*

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TABLE (10), epoch 1550

u	K_0	K_1 cos λ	K_1' sin λ	K_2 cos 2λ	K_2' sin 2λ	K_3 cos 3λ	K_3' sin 3λ	K_4 cos 4λ	K_4' sin 4λ	K_5 cos 5λ	K_5' sin 5λ
10°	X_r = +0,364	+0,083	+0,291	+0,068	−0,196	+0,004	−0,011	−0,001	0,000	0,000	0,000
20	X_r = +0,797	−0,061	+0,257	+0,037	−0,305	+0,017	−0,032	−0,005	−0,002	+0,001	+0,003
30	X_r = +1,318	−0,203	+0,205	+0,057	−0,302	+0,042	−0,045	−0,009	−0,008	+0,003	+0,013
40	X_r = +1,891	−0,268	+0,142	−0,060	−0,221	+0,074	−0,035	−0,004	−0,022	+0,008	+0,028
50	X_r = +2,438	−0,251	+0,072	−0,217	−0,126	+0,083	−0,004	+0,012	−0,041	+0,011	+0,042
60	X_r = +2,886	−0,200	−0,003	−0,340	−0,058	+0,081	+0,022	+0,030	−0,052	+0,010	+0,046
70	X_r = +3,190	−0,176	−0,084	−0,357	−0,019	+0,031	+0,027	+0,037	−0,045	+0,005	+0,033
80	X_r = +3,335	−0,207	−0,171	−0,246	+0,008	−0,044	+0,006	+0,026	−0,015	−0,004	+0,006
90	X_r = +3,337	−0,265	−0,257	−0,054	+0,038	−0,099	−0,023	−0,004	+0,025	−0,010	−0,022
100	X_r = +3,200	−0,291	−0,325	+0,122	+0,062	−0,119	−0,038	−0,032	+0,055	−0,012	−0,040
110	X_r = +2,966	−0,242	−0,354	+0,213	+0,074	−0,096	−0,029	−0,040	+0,063	−0,009	−0,043
120	X_r = +2,667	−0,104	−0,327	+0,266	+0,086	−0,049	0,000	−0,029	+0,044	−0,004	−0,034
130	X_r = +2,339	+0,078	−0,238	+0,251	+0,121	−0,004	+0,032	−0,008	+0,016	−0,001	−0,021
140	X_r = +1,985	+0,262	−0,088	+0,208	+0,185	+0,021	+0,050	+0,007	−0,004	0,000	−0,008
150	X_r = +1,592	+0,411	+0,059	+0,095	+0,245	+0,025	+0,045	+0,011	−0,010	0,000	−0,003
160	X_r = +1,131	+0,511	+0,203	+0,089	+0,247	+0,015	+0,028	+0,006	−0,005	0,000	−0,001
170	X_r = +0,593	+0,562	+0,303	+0,058	+0,159	+0,005	+0,008	+0,001	0,000	0,000	0,000

TABLE (11), epoch 1550

u	l_0	Z_1 cos λ	l_2	Z_2 sin λ	Y_3 cos 2λ	Z_3 sin 3λ	l_4 cos 3λ	Z_4 sin 4λ	l_5 cos 5λ	Z_5 sin 5λ
10°	Y_r = +0,303	−0,123	−0,205	−0,073	−0,010	−0,002	−0,001	+0,001	+0,000	+0,000	
20	Y_r = +0,295	−0,069	−0,367	−0,126	−0,039	−0,014	−0,002	+0,005	+0,003	−0,001	
30	Y_r = +0,283	−0,001	−0,470	−0,145	−0,070	−0,038	−0,007	+0,013	+0,015	−0,005	
40	Y_r = +0,267	+0,066	−0,510	−0,115	−0,088	−0,078	−0,022	+0,017	+0,039	−0,011	
50	Y_r = +0,248	+0,115	−0,506	−0,033	−0,088	−0,124	−0,047	+0,013	+0,074	−0,020	
60	Y_r = +0,228	+0,147	−0,484	+0,083	−0,072	−0,164	−0,080	−0,006	+0,110	−0,029	
70	Y_r = +0,202	+0,159	−0,459	+0,212	−0,051	−0,184	−0,112	−0,032	+0,140	−0,034	
80	Y_r = +0,170	+0,196	−0,441	+0,312	−0,040	−0,173	−0,128	−0,054	+0,151	−0,032	

* In Publications I and II as well as in the present Publication III, the following notation applies: λ is the eastern longitude from Greenwich; φ is the geographic latitude; u is the angular separation from astronomical North Pole so that $\varphi + u = 90°$; $T = \frac{V}{R}$ the potential divided by the Earth's radius R $T = \frac{1}{2}(\frac{1}{R} - z)$ the ideal distribution of the magnetism on the Earth's surface; X is the northern, Y is the western and Z is the vertical component. δ is the declination, i is the inclination, T is the horizontal and J is the total intensity. When x, y, z, δ, i, T are calculated according to the theory, then they are called X, Y, Z, δ, i, T. When they are observed, they are called $X_r, Y_r, Z_r, \delta_r, i_r, T_r$. The units for for intensity are milligram, mm and average seconds.

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TABLE (11) Epoch 1550

u	l_0 cos λ	l_1 sin λ	l_2 cos 2λ	l_3 sin 2λ	l_4 cos 3λ	l_5 sin 3λ	l_6 cos 4λ	l_7 sin 4λ	l_8 cos 5λ	l_9 sin 5λ
90°	y_r = +0,130	+0,233	−0,426	+0,360	−0,043	−0,132	−0,123	−0,062	+0,141	−0,035
100	y_r = +0,080	+0,288	−0,414	+0,351	−0,062	−0,075	−0,096	−0,069	+0,115	−0,015
110	y_r = +0,020	+0,352	−0,407	+0,304	−0,034	−0,016	−0,055	−0,023	+0,080	−0,006
120	y_r = −0,043	+0,419	−0,410	+0,241	−0,001	+0,025	−0,016	+0,004	+0,048	+0,001
130	y_r = −0,120	+0,477	−0,418	+0,193	−0,103	+0,046	+0,011	+0,022	+0,024	+0,002
140	y_r = −0,189	+0,522	−0,416	+0,161	−0,087	+0,046	+0,018	+0,014	+0,009	+0,003
150	y_r = −0,251	+0,552	−0,382	+0,139	−0,060	+0,033	+0,014	+0,016	+0,003	+0,001
160	y_r = −0,293	+0,568	−0,299	+0,110	−0,030	+0,016	+0,006	+0,006	+0,001	+0,001
170	y_r = −0,329	+0,577	−0,167	+0,061	−0,007	+0,004	+0,001	+0,001	+0,000	+0,000

TABLE (12) Epoch 1550

u	m_0 cos λ	n_1 sin λ	M_1 cos 2λ	n_2 sin 2λ	M_2 cos 3λ	m_3 sin 3λ	M_3 cos 4λ	n_4 sin 4λ	M_4 cos 5λ	m_5 sin 5λ	M_5
10	z_r = +5,823	−0,180	−0,133	−0,034	+0,078	+0,000	+0,004	+0,000	+0,000	+0,000	+0,000
20	z_r = +5,758	−0,254	−0,255	−0,121	+0,170	−0,003	+0,026	+0,004	+0,000	+0,000	−0,002
30	z_r = +5,546	−0,387	−0,354	−0,220	+0,279	−0,017	+0,067	+0,013	+0,002	−0,003	−0,009
40	z_r = +5,095	−0,629	−0,424	−0,265	+0,217	−0,053	+0,106	+0,024	+0,011	−0,009	−0,032
50	z_r = +4,378	+0,125	−0,470	−0,193	+0,066	−0,128	+0,117	+0,025	+0,040	−0,020	−0,072
60	z_r = +3,428	+0,217	−0,484	+0,014	+0,056	−0,208	+0,057	+0,003	+0,035	−0,033	−0,120
70	z_r = +2,295	+0,250	−0,473	+0,295	+0,032	−0,260	+0,057	−0,035	+0,135	−0,040	−0,162
80	z_r = +1,090	+0,286	−0,421	+0,540	+0,015	−0,256	+0,030	−0,075	+0,168	−0,040	−0,181
90	z_r = −0,124	+0,381	−0,324	+0,676	+0,595	−0,181	+0,036	−0,083	+0,163	−0,030	−0,169
100	z_r = −1,286	+0,549	−0,175	+0,590	+0,565	−0,086	+0,072	−0,067	+0,119	−0,017	−0,131
110	z_r = −2,345	+0,744	+0,013	+0,431	+0,539	+0,012	+0,115	−0,024	+0,055	−0,003	−0,085
120	z_r = −3,291	+0,890	+0,212	+0,270	+0,529	+0,063	+0,138	+0,017	+0,001	+0,003	−0,044
130	z_r = −4,108	+0,935	+0,330	+0,171	+0,528	+0,079	+0,129	+0,035	−0,027	+0,004	−0,018
140	z_r = −4,826	+0,862	+0,378	+0,137	+0,491	+0,053	+0,094	+0,030	−0,026	+0,003	−0,006
150	z_r = −5,456	+0,699	+0,482	+0,116	+0,384	+0,031	+0,051	+0,015	−0,014	+0,001	−0,001
160	z_r = −5,973	+0,483	+0,329	+0,075	+0,219	+0,011	+0,017	+0,004	−0,004	+0,000	+0,000
170	z_r = −6,325	+0,244	+0,215	+0,024	+0,065	+0,002	+0,003	+0,000	−0,000	+0,000	+0,000

TABLE (20) Epoch 1550

Different $\delta_r - \delta_\ell$ between the declination calculated according to the theory δ_r and the observed δ_r (cf. given here under the following table (16)

φ	λ = 0°	15°	30°	45°	60°	75°	300°	315°	330°	345°
+60°	−0,3	+0,4							+2,9	+0,7
+50	−0,7	−0,8	+0,7					−4,2	+0,1	−0,6
+40	−0,7	−2,3	−0,9	+3			−3,1	0,0	+1,0	+0,4
+30	−0,7	−2,7	−0,6	+1	+5,2		+1,2	+1,3	+0,8	+0,7
+20	−0,8	−2,6	−1,0	+3,6	+4,8		+2,7	+0,9	+0,3	+0,4
+10	−1,5	−3,1	−1,2	+3,1	+4,1	+4,4		−0,3	−0,4	−0,3
0	−1,3	−2,3	−0,8	+2,8	+3,5	+3,8		−0,8	−0,4	+0,4
−10	+0,5	−0,9	+0,2	+2,3	+3,3				+1,3	+1,9
−20	+1,9	+0,3	+1,0	+1,8	+2,3				+1,7	+3,6
−30	+2,4	+1,1	+1,6	+0,7	+0,7				+1,3	+3,5
−40	+2,6	+1,7	+2,4	−0,3					+0,7	

(den Mittelwert)

On the average, for these 80 values we have $\delta_r - \delta_\ell = \pm 1,62$ whereas for the epoch 1600, 1650, 1700, 1780 the averages are $\pm 1,72$

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Table (13). epoch 1550. northern component X_c according to the theory. For $\varphi = +90°$ we have $\varphi = 64°51'$, λ, $X_c = 0{,}33167\cos\varphi$, $Y_c = 0{,}33167\sin\varphi$, for $\varphi = -\varphi$ we have $\varphi = \lambda - 30°22'$, $X_c = 0{,}67\ldots\cos\varphi$, $Y_c = 0{,}67\ldots\sin\varphi$. The values X_c without a sine are positive

φ	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	0,243	0,247	0,236	0,317	0,333	0,331	0,325	0,317	0,308	0,298	0,287	0,276	0,265	−0,255	−0,245	−0,237	−0,230	−0,224	−0,220	−0,217	−0,216	−0,217	−0,220	−0,225
+80	0,318	0,325	0,334	0,413	0,449	0,454	0,457	0,455	0,451	0,445	0,437	0,427	0,417	0,407	0,397	0,388	0,380	0,373	0,368	0,365	0,364	0,365	0,368	0,373
+70	0,396	0,405	0,415	0,498	0,538	0,544	0,548	0,546	0,542	0,536	0,528	0,518	0,508	0,498	0,488	0,479	0,471	0,464	0,459	0,456	0,455	0,456	0,459	0,464
+60	1,288	1,074	0,965	0,953	1,064	1,174	1,211	1,212	1,208	1,200	1,189	1,176	1,161	1,145	1,129	1,113	1,098	1,085	1,074	1,066	1,061	1,060	1,062	1,066
+50	1,671	1,572	1,444	1,422	1,496	1,572	1,598	1,598	1,592	1,581	1,567	1,550	1,531	1,511	1,491	1,472	1,454	1,438	1,425	1,415	1,409	1,407	1,409	1,415
+40	2,036	2,004	1,907	1,865	1,880	1,905	1,910	1,907	1,898	1,884	1,865	1,843	1,818	1,792	1,766	1,741	1,718	1,698	1,682	1,670	1,663	1,661	1,663	1,670
+30	2,367	2,348	2,308	2,268	2,265	2,277	2,277	2,268	2,251	2,228	2,200	2,169	2,135	2,100	2,065	2,032	2,001	1,974	1,952	1,935	1,924	1,920	1,924	1,935
+20	2,710	2,733	2,704	2,721	2,714	2,707	2,694	2,674	2,647	2,614	2,576	2,534	2,489	2,443	2,397	2,353	2,312	2,277	2,248	2,227	2,213	2,208	2,213	2,227
+10	3,063	3,143	3,142	3,156	3,142	3,129	3,106	3,073	3,030	2,978	2,919	2,855	2,787	2,719	2,653	2,591	2,535	2,487	2,449	2,421	2,403	2,397	2,403	2,421
0	3,408	3,484	3,482	3,508	3,498	3,482	3,454	3,414	3,364	3,305	3,240	3,170	3,097	3,024	2,952	2,885	2,825	2,774	2,733	2,704	2,686	2,680	2,686	2,704
−10	3,748	3,820	3,822	3,850	3,847	3,835	3,814	3,784	3,746	3,700	3,648	3,590	3,528	3,465	3,403	3,345	3,293	3,249	3,214	3,189	3,173	3,168	3,173	3,189
−20	4,082	4,147	4,151	4,181	4,181	4,174	4,161	4,142	4,117	4,086	4,050	4,010	3,967	3,923	3,879	3,838	3,801	3,770	3,745	3,727	3,716	3,712	3,716	3,727
−30	4,408	4,463	4,469	4,500	4,504	4,501	4,493	4,480	4,463	4,442	4,417	4,389	4,359	4,328	4,297	4,267	4,240	4,217	4,198	4,184	4,175	4,172	4,175	4,184
−40	4,722	4,763	4,772	4,804	4,811	4,811	4,807	4,799	4,787	4,772	4,754	4,734	4,713	4,691	4,669	4,648	4,629	4,613	4,600	4,590	4,584	4,582	4,584	4,590
−50	5,023	5,051	5,062	5,094	5,104	5,107	5,106	5,101	5,093	5,082	5,069	5,054	5,038	5,021	5,004	4,988	4,973	4,960	4,950	4,942	4,937	4,936	4,937	4,942
−60	5,310	5,327	5,339	5,370	5,384	5,390	5,391	5,388	5,383	5,376	5,367	5,357	5,346	5,335	5,324	5,313	5,304	5,296	5,290	5,286	5,284	5,284	5,286	5,290
−70	5,582	5,587	5,602	5,632	5,652	5,663	5,667	5,666	5,663	5,658	5,652	5,645	5,638	5,631	5,625	5,620	5,616	5,613	5,612	5,612	5,613	5,616	5,620	5,626
−80	5,829	5,829	5,846	5,875	5,899	5,914	5,921	5,922	5,921	5,919	5,916	5,913	5,910	5,908	5,907	5,907	5,908	5,911	5,916	5,922	5,929	5,938	5,948	5,960
−90	6,039	6,039	6,056	6,084	6,109	6,126	6,135	6,138	6,138	6,137	6,136	6,136	6,137	6,139	6,142	6,147	6,153	6,161	6,171	6,183	6,197	6,213	6,231	6,252

Table (14) epoch 1550. Western component Y calculated according to theory. Units of the third decimal

φ	λ_E	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°		+315	+317	+314	+311	+307	+302	+298	+293	+289	+285	+281	+278	+276	+274	+273	+272	+272	+272	+273	+274	+276	+278	+281	+285
+80		+47	+49	+51	+53	+55	+57	+58	+59	+60	+61	+62	+63	+64	+65	+66	+67	+68	+69	+70	+71	+72	+73	+74	+75
+70		−110	−109	−107	−104	−101	−98	−95	−92	−89	−86	−83	−80	−77	−74	−71	−68	−65	−62	−59	−56	−53	−50	−47	−44
+60		−343	−341	−336	−330	−323	−315	−307	−298	−289	−279	−269	−259	−249	−239	−229	−219	−210	−201	−193	−185	−178	−172	−167	−163
+50		−514	−511	−504	−494	−482	−469	−455	−440	−424	−408	−391	−374	−357	−340	−323	−307	−291	−276	−262	−249	−238	−228	−220	−214
+40		−619	−616	−607	−594	−579	−562	−544	−525	−505	−484	−463	−442	−421	−400	−380	−360	−342	−325	−309	−295	−283	−272	−263	−256
+30		−658	−654	−644	−630	−613	−594	−574	−553	−531	−508	−485	−463	−440	−418	−397	−376	−357	−339	−323	−309	−296	−285	−276	−268
+20		−630	−626	−616	−602	−585	−566	−545	−523	−500	−477	−454	−431	−409	−387	−366	−346	−328	−311	−296	−283	−271	−261	−253	−246
+10		−540	−536	−527	−513	−497	−478	−458	−437	−415	−393	−371	−350	−329	−309	−290	−272	−256	−242	−229	−218	−209	−201	−195	−190
0		−403	−400	−392	−380	−365	−348	−330	−311	−292	−273	−254	−236	−219	−203	−188	−175	−163	−153	−145	−138	−133	−129	−127	−126
−10		−232	−230	−224	−216	−206	−195	−183	−170	−157	−144	−131	−119	−108	−98	−89	−81	−75	−69	−65	−62	−60	−59	−59	−60
−20		−43	−42	−39	−35	−30	−25	−19	−13	−7	−1	+5	+10	+15	+19	+23	+26	+28	+30	+31	+32	+32	+32	+32	+31
−30		+154	+154	+152	+149	+145	+140	+135	+130	+125	+120	+115	+111	+107	+104	+102	+101	+101	+101	+102	+104	+107	+111	+115	+120
−40		+337	+338	+337	+335	+332	+329	+326	+323	+320	+317	+315	+313	+312	+312	+312	+313	+315	+318	+321	+325	+330	+335	+341	+348
−50		+504	+506	+506	+505	+504	+503	+502	+502	+502	+503	+504	+506	+508	+511	+514	+518	+522	+527	+532	+538	+545	+552	+560	+569
−60		+650	+652	+653	+654	+655	+656	+658	+660	+662	+665	+668	+671	+675	+679	+683	+688	+693	+698	+704	+711	+718	+726	+734	+743
−70		+772	+774	+776	+778	+781	+784	+787	+791	+795	+799	+803	+808	+813	+818	+823	+828	+834	+840	+846	+853	+860	+868	+876	+885
−80		+873	+875	+877	+880	+883	+886	+889	+893	+897	+901	+905	+910	+914	+919	+924	+929	+934	+940	+946	+952	+959	+966	+974	+982
−90		+952	+954	+956	+958	+961	+964	+967	+970	+974	+978	+982	+986	+990	+994	+999	+1003	+1008	+1013	+1018	+1024	+1030	+1036	+1043	+1050

Table (14) epoch 1550. Western component Y_r calculated according to theory. Units of the 3rd decimel

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
-60°	-676	-356	+35	+400	+703	+884	+916	+812	+613	+396	+197	+42	-60	-124	-153	-150	-123	-96	-124	-248	-463	-702	-861	-858
-70	-621	-347	-13	+325	+608	+794	+858	+804	+668	+487	+307	+153	+35	-45	-93	-117	-134	-170	-248	-380	-554	-719	-813	-785
-80	-502	-285	-22	+263	+478	+648	+741	+750	+688	+577	+440	+299	+170	+57	-34	-123	-208	-300	-405	-518	-626	-701	-714	-651
-90	-339	-128	-4	+178	+279	+429	+529	+647	+671	+650	+584	+478	+339	+178	+4	-170	-332	-472	-579	-647	-671	-650	-584	-478

Table (15) epoch 1550. Vertical component Z_r calculated with theory. The values without side are positive. For $\varphi = +90°$ we have $Z_r = +5.832$. for $\varphi = -90°$ we have $Z_r = -6.458$.

φ \ λ =	0	15	30	45	60	75	90	105	120	135	150	165	180	195	210	225	240	255	270	285	300	315	330	345
+80°	5,609	5,628	5,636	5,683	5,703	5,713	5,720	5,729	5,747	5,781	5,832	5,898	5,969	6,038	6,092	6,117	6,113	6,069	5,994	5,897	5,797	5,709	5,644	5,618
+70	5,384	5,493	5,608	5,685	5,707	5,671	5,600	5,529	5,487	5,501	5,580	5,717	5,858	6,007	6,252	6,363	6,393	6,329	6,166	5,931	5,677	5,467	5,364	5,323
+60	5,132	5,356	5,574	5,697	5,687	5,550	5,349	5,152	5,015	4,975	5,058	5,260	5,546	5,852	6,120	6,327	6,439	6,410	6,209	5,856	5,459	5,133	4,968	4,910
+50	4,757	5,058	5,356	5,513	5,449	5,166	4,822	4,520	4,311	4,225	4,302	4,566	4,951	5,334	5,634	5,863	6,037	6,102	5,946	5,556	5,071	4,681	4,512	4,554
+40	4,187	4,507	4,853	5,014	4,839	4,403	3,937	3,599	3,395	3,396	3,379	3,721	4,233	4,675	4,911	5,024	5,169	5,307	5,235	4,919	4,445	4,078	3,937	3,989
+30	3,415	3,719	4,082	4,210	3,893	3,269	2,710	2,419	2,305	2,252	2,364	2,807	3,463	3,955	4,058	3,940	3,823	4,041	4,112	3,895	3,535	3,276	3,208	3,259
+20	2,505	2,775	3,114	3,171	2,630	1,893	1,423	1,075	1,100	1,129	1,284	1,815	2,605	3,157	3,132	2,753	2,500	2,551	2,657	2,573	2,370	2,267	2,306	2,385
+10	1,545	1,795	2,088	2,042	1,416	0,638	-0,157	-0,568	-0,118	-0,010	0,166	0,721	1,565	2,151	2,062	1,518	1,074	1,006	1,107	1,114	1,056	1,110	1,272	1,417
0	0,597	0,834	1,045	0,878	0,199	-0,750	-1,387	-1,668	-1,275	-1,138	-0,977	-0,596	0,271	0,824	0,751	0,220	-0,257	-0,332	-0,329	-0,298	-0,229	-0,124	0,153	0,408
-10	-0,317	-0,079	0,044	-0,173	-0,849	-1,718	-2,321	-2,450	-2,328	-2,225	-2,120	-1,779	-1,205	-0,767	-0,776	-1,135	-1,475	-1,584	-1,565	-1,568	-1,343	-1,343	-0,988	-0,667
-20	-1,189	-0,943	-0,881	-1,116	-1,689	-2,421	-2,991	-3,227	-3,245	-3,234	-3,205	-3,029	-2,695	-2,353	-2,333	-2,456	-2,577	-2,603	-2,617	-2,683	-2,693	-2,594	-2,069	-1,581
-30	-2,043	-1,765	-1,715	-1,921	-2,377	-2,973	-3,514	-3,863	-4,047	-4,137	-4,169	-4,112	-3,965	-3,804	-3,698	-3,637	-3,572	-3,535	-3,574	-3,691	-3,735	-3,537	-3,077	-2,515
-40	-2,884	-2,570	-2,483	-2,640	-2,995	-3,491	-4011	-4,445	-4,735	-4,900	-4,971	-4,972	-4,928	-4,834	-4,723	-4,530	-4,465	-4,413	-4,477	-4,607	-4,645	-4,442	-3,977	-3,396
-50	-3,735	-3,410	-3,298	-3,391	-3,669	-4,084	-4555	-4,988	-5,311	-5,505	-5,588	-5,606	-5,583	-5,430	-5,444	-5,339	-5,251	-5,340	-5,311	-5,408	-5,403	-5,189	-4,761	-4,222
-60	-4,534	-4,312	-4,188	-4,238	-4,439	-4,756	-5,127	-5,484	-5,767	-5,948	-6,038	-6,066	-6,056	-6,026	-5,988	-5,936	-5,913	-5,934	-5,987	-6,022	-5,965	-5,762	-5,414	-4,992
-70	-5,400	-5,213	-5,128	-5,138	-5,252	-5,443	-5,672	-5,901	-6,090	-6,242	-6,332	-6,373	-6,388	-6,387	-6,380	-6,378	-6,386	-6,405	-6,416	-6,395	-6,312	-6,150	-5,918	-5,631
-80	-6,455	-6,377	-6,336	-6,336	-6,375	-6,446	-6,537	-6,634	-6,727	-6,801	-6,870	-6,915	-6,947	-6,947	-6,922	-6,887	-6,861	-6,852	-6,861	-6,858	-6,834	-6,771	-6,668	-6,537

Table (16) epoch 1550. Declination δ_r according to theory. Degrees in minutes are separated by dots.

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	+44°.5	+49'.5	+34'.5	+19'.5	+4'.5	-10'.5	-25'.5	-43'.5	-58'.5	-70'.5	-85'.5	-100'.5	-115'.5	-130'.5	-145'.5	-160'.5	-175'.5	+165°1'.5	+150°1'.5	+135°1'.5	+120°1'.5	+105°1'.5	+90°1'.5	+75°1'.5
+80	+9·32	+9·49	+9·37	+8·12	+11·35	+11·32	+7·55	+1·1	-8·7	-18·29	-30·5	-42·27	-52·25	-62·25	-86·38	-102·31	-122·36	+119·53	+101·14	+72·29	+56·43	+42·26	+29·23	+18·9
+70	-7·24	-14·37	-7·29	+5·9	+16·44	+20·23	+17·23	+10·44	+2·19	-7·7	-16·39	-25·54	-33·59	-39·56	-48·27	-37·14	-30·14	+32·20	+46·15	+49·17	+36·3	+25·13	+13·6	+1·39
+60	-11·39	-14·25	-9·7	+4·37	+16·50	+20·42	+18·6	+12·15	+4·35	-3·20	-11·48	-19·28	-24·53	-26·30	-25·14	-17·50	-6·45	+9·16	+23·33	+28·42	+25·27	+17·6	+6·25	-3·54
+50	-10·50	-13·22	-7·5	+5·1	+15·33	+18·40	+16·6	+11·0	+4·58	-2·2	-9·45	-16·46	-20·26	-19·11	-14·29	-9·37	-4·40	+2·22	+11·31	+17·38	+17·11	+11·14	+2·49	-5·11
+40	-8·42	-9·37	-4·58	+5·42	+14·47	+16·52	+13·41	+8·43	+3·42	-1·59	-9·6	-15·46	-18·18	-14·27	-2·48	-4·1	-2·48	-0·4	+5·23	+10·17	+10·41	+6·27	+0·25	-4·54
+30	-6·53	-7·48	-3·9	+6·48	+14·59	+16·3	+11·49	+6·24	+2·3	-2·25	-8·59	-15·32	-17·11	-11·8	-2·43	+0·26	-0·34	-0·42	+2·10	+5·30	+5·43	+2·38	-1·26	-4·26
+20	-5·51	-6·15	-1·46	+8·9	+15·50	+16·9	+10·45	+4·26	+0·28	-2·55	-8·53	-15·8	-15·59	-8·38	+0·50	+3·56	+1·37	-0·30	+0·26	+2·23	+2·6	-0·38	-3·9	-6·29
+10	-5·45	-5·16	-0·9	+9·36	+17·6	+17·7	+10·43	+3·22	-0·36	-3·13	-8·22	-13·59	-14·10	-6·54	+2·22	+5·46	+3·9	0·0	-0·22	+0·22	-0·30	-3·10	-5·0	-5·23

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TABLE (16) epoch 1550 Declination δ_Υ calculated according to theory

TABLE (17) epoch 1550 Inclination I_Υ according to theory. Values without sine are positive. Degrees in mins. are separated by dots. For $\phi = +90°$ = $\lambda = 0°$

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Table (18) epoch 1550. Horizontal intensity $\mathcal{H}$, according to theory. For $\varphi_0 = 90° \equiv \lambda_0 = 0°$, $J = 0.671$.

φ	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°	360°
+80°	0.525	0.477	0.435	0.427	0.453	0.525	0.603	0.674	0.712	0.741	0.728	0.696	0.646	0.598	0.554	0.516	0.484	0.456	0.432	0.410	0.391	0.375	0.362	0.351	0.345
+70	0.833	0.744	0.673	0.640	0.659	0.744	0.844	0.944	1.018	1.081	1.110	1.119	1.113	1.114	0.945	0.713	0.657	0.557	0.521	0.496	0.479	0.468	0.461	0.458	0.458
+60	1.213	1.109	0.977	0.856	0.756	0.696	0.696	0.756	0.863	1.014	1.184	1.312	1.401	1.484	1.479	1.433	1.373	1.311	1.241	0.981	0.779	0.649	0.569	0.523	0.508
+50	1.671	1.572	1.488	1.408	1.348	1.314	1.307	1.328	1.377	1.443	1.508	1.568	1.618	1.658	1.684	1.694	1.686	1.663	1.626	1.572	1.502	1.419	1.326	1.229	1.159
+40	2.110	2.030	2.012	2.077	2.158	2.256	2.366	2.474	2.561	2.624	2.646	2.627	2.567	2.467	2.327	2.159	1.979	1.797	1.625	1.472	1.346	1.252	1.196	1.183	1.213
+30	2.445	2.400	2.472	2.592	2.746	2.922	3.098	3.252	3.381	3.481	3.546	3.565	3.528	3.434	3.285	3.092	2.870	2.640	2.424	2.237	2.093	1.997	1.950	1.945	1.975
+20	2.745	2.749	2.785	2.929	3.123	3.333	3.543	3.742	3.904	4.026	4.098	4.109	4.060	3.955	3.793	3.585	3.345	3.091	2.844	2.627	2.462	2.359	2.324	2.357	2.449
+10	2.977	3.022	3.094	3.215	3.378	3.572	3.772	3.956	4.104	4.208	4.264	4.270	4.225	4.130	3.990	3.815	3.615	3.402	3.189	2.990	2.822	2.699	2.630	2.625	2.683
0	3.117	3.200	3.290	3.419	3.579	3.755	3.931	4.091	4.222	4.317	4.368	4.374	4.336	4.256	4.140	3.994	3.825	3.639	3.446	3.259	3.095	2.967	2.886	2.858	2.884
-10	3.193	3.259	3.329	3.429	3.557	3.699	3.844	3.980	4.098	4.191	4.254	4.287	4.290	4.263	4.206	4.122	4.013	3.882	3.734	3.576	3.419	3.276	3.160	3.085	3.060
-20	3.213	3.246	3.279	3.329	3.396	3.480	3.575	3.677	3.781	3.882	3.975	4.057	4.126	4.180	4.220	4.246	4.259	4.259	4.247	4.224	4.189	4.142	4.083	4.012	3.933
-30	3.177	3.178	3.178	3.183	3.196	3.220	3.256	3.305	3.368	3.444	3.531	3.625	3.722	3.817	3.906	3.985	4.051	4.101	4.134	4.150	4.149	4.132	4.101	4.059	4.010
-40	3.090	3.060	3.031	3.008	2.994	2.992	3.004	3.031	3.075	3.136	3.213	3.303	3.402	3.504	3.604	3.697	3.779	3.847	3.898	3.931	3.945	3.941	3.921	3.889	3.848
-50	2.974	2.943	2.918	2.902	2.899	2.911	2.935	3.057	3.214	3.401	3.767	3.902	3.847	3.962	3.962	3.962	3.962	3.962	3.962	3.962	3.962	3.962	3.962	3.962	3.962
-60	2.839	2.858	2.920	3.018	3.150	3.307	3.480	2.811	2.935	3.057	3.214	3.401	3.767	3.902	3.847	3.962	3.962	3.962	3.962	3.962	3.962	3.962	3.962	3.962	3.962
-70	1.857	1.938	1.973	1.915	4.824	4.481	4.423	4.271	1.045	0.893	0.711	0.577	0.501	0.470	0.476	0.516	0.588	0.688	0.811	0.952	1.104	1.260	1.411	1.548	1.665
-80	1.318	1.384	1.406	1.386	1.329	1.238	1.113	0.966	0.822	0.633	0.447	0.315	0.230	0.198	0.217	0.285	0.398	0.550	0.732	0.933	1.140	1.339	1.516	1.657	1.748

Table (19) epoch 1550 Total intensity J accord. to theory. For $\varphi_0 = -90° \equiv \lambda_0 = 0°$, $J = 0.671$.

φ	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°	360°
+80°	5.634	5.647	5.673	5.699	5.721	5.737	5.745	5.739	5.721	5.693	5.658	5.618	5.578	5.537	5.499	5.464	5.434	5.409	5.390	5.377	5.370	5.369	5.373	5.382	5.396
+70	5.451	5.542	5.643	5.716	5.769	5.795	5.795	5.772	5.729	5.669	5.596	5.513	5.423	5.333	5.253	5.183	5.126	5.083	5.055	5.042	5.044	5.060	5.090	5.132	5.176
+60	5.278	5.469	5.640	5.776	5.894	5.971	5.982	5.944	5.877	5.794	5.699	5.597	5.494	5.394	5.304	5.230	5.174	5.136	5.116	5.113	5.126	5.154	5.196	5.248	5.304
+50	5.041	5.222	5.455	5.711	5.944	6.146	6.298	6.378	6.362	6.262	6.092	5.873	5.633	5.396	5.184	5.012	4.885	4.805	4.771	4.780	4.827	4.904	5.000	5.102	5.202
+40	4.829	4.960	5.173	5.428	5.727	6.020	6.278	6.460	6.538	6.490	6.317	6.030	5.650	5.219	4.800	4.450	4.203	4.078	4.078	4.200	4.427	4.722	5.044	5.350	5.599
+30	4.623	4.772	4.994	5.264	5.587	5.907	6.185	6.329	6.314	6.164	5.925	5.660	5.345	4.980	4.565	4.157	3.800	3.545	3.427	3.477	3.715	4.111	4.606	5.136	5.626
+20	4.470	4.378	4.331	4.347	4.607	3.769	3.631	3.518	3.473	3.490	3.509	3.573	3.673	3.803	3.940	4.077	4.198	4.285	4.337	4.359	4.359	4.359	4.359	4.359	4.359
+10	4.366	4.218	4.167	4.233	4.481	4.123	3.933	3.922	3.939	3.944	3.976	4.036	4.091	4.107	4.080	4.011	3.907	3.780	3.642	3.507	3.387	3.292	3.227	3.197	3.202
0	4.328	4.311	4.315	4.365	4.384	4.322	4.181	4.030	3.915	3.850	3.830	3.850	3.915	4.015	4.138	4.265	4.380	4.471	4.530	4.554	4.543	4.500	4.431	4.347	4.260
-10	4.310	4.320	4.323	4.324	4.317	4.303	4.284	4.263	4.242	4.224	4.211	4.205	4.208	4.220	4.240	4.265	4.292	4.317	4.337	4.350	4.353	4.345	4.326	4.299	4.268
-20	3.060	4.035	4.023	4.017	3.955	3.867	4.069	4.179	4.270	4.339	4.387	4.414	4.423	4.414	4.387	4.345	4.292	4.232	4.170	4.110	4.054	4.003	3.957	3.916	3.880
-30	3.417	3.758	3.863	3.935	3.977	4.000	4.003	4.000	3.991	3.977	3.958	3.935	3.909	3.881	3.852	3.823	3.795	3.769	3.746	3.726	3.711	3.700	3.694	3.693	3.697
-40	3.900	3.621	3.537	3.604	3.814	4.133	4.551	4.955	5.270	5.436	5.436	5.270	4.955	4.551	4.133	3.814	3.604	3.537	3.621	3.900	4.133	4.551	4.955	5.270	5.436
-50	4.480	4.265	4.039	4.127	4.607	4.608	4.827	5.027	5.227	5.565	5.740	5.823	5.865	5.874	5.852	5.812	5.764	5.714	5.666	5.624	5.589	5.562	5.543	5.532	5.528
-60	5.111	4.878	4.762	4.781	4.918	5.146	5.342	5.459	5.522	5.922	6.070	6.149	6.183	6.146	6.073	6.005	5.944	5.894	5.859	5.839	5.834	5.844	5.869	5.907	5.946
-70	5.711	5.562	5.481	5.483	5.559	5.696	5.866	6.017	6.117	6.279	6.400	6.477	6.511	6.511	6.477	6.400	6.279	6.117	6.017	5.866	5.696	5.559	5.483	5.481	5.562
-80	6.197	6.135	6.101	6.093	6.121	6.179	6.237	6.276	6.310	6.337	6.357	6.369	6.373	6.369	6.357	6.337	6.310	6.276	6.237	6.179	6.121	6.093	6.101	6.135	6.197

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C. Earth magnetic elements for the epoch 1900.

The following tables (21), (22), (23) were used as a basis for calculating the coefficients gh of the theory for epoch 1900. Table (21) declination ϕ: Epoch 1900.

φ \ λ = 0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+12,3	+12,9	-4,7	-14,3	-30,8	-32,2	-31,3	-32,3	-4,5?	-34,0	-33,5	-33,5	-44,5	-33,3	-43,3	+10,5	+44,2	+40,2	+11,7	+9,3	+6,3	+11,3	+12,3
+70	+11,1	+2,1	-1,4	-12,4	-19,3	-21,7	-21,5	-21,1	-6,3	+0,6	-1,1	-5,9	-11,4	-12,6	-18,8	-49,5	-41,1	-74,7	+06,6	+11,0	+4,3	+3,3	+3,3
+60	+10,2	+4,5	-0,5	-4,4	-7,2	-8,8	-7,8	+5,3	+2,0	+4,7	-1,1	-3,2	-7,3	-10,3	-14,6	-32,1	-35,3	-34,2	+5,5	+11,0	+11,3	+11,3	+11,4
+50	+10,0	+6,2	+2,1	-1,0	-3,1	-4,0	-1,1	+4,4	+4,4	+3,3	+2,3	-1,0	-4,6	-7,1	-11,5	-24,9	-27,2	-27,3	-11,2	+2,3	+11,3	+11,3	+11,3
+40	+11,4	+7,4	+3,3	+1,3	-0,3	-1,3	-1,3	+2,3	+4,3	+4,3	+3,3	+1,3	-1,3	-4,3	-7,3	-14,3	-17,3	-17,3	-7,3	+1,3	+7,3	+11,3	+11,3
+30	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3
+20	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3
+10	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3
0	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3
-10	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3
-20	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3
-30	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3
-40	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3
-50	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3
-60	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3
-70	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3
-80	+11,3	+7,3	+3,3	+1,3	-0,3	-1,3	-1,3	+1,3	+3,3	+4,3	+3,3	+1,3	-1,3	-3,3	-5,3	-7,3	-8,3	-7,3	-4,3	+1,3	+6,3	+10,3	+11,3

Table (22) Epoch 1900 Declination ϕ.

φ \ λ = 0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+11,5	+10,3	+4,3	-1,3	-7,3	-11,3	-13,3	-14,3	-15,3	-16,3	-16,3	-16,3	-16,3	-15,3	-14,3	-12,3	-9,3	-5,3	-1,3	+3,3	+6,3	+9,3	+11,3
+70	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
+60	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
+50	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
+40	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
+30	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
+20	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
+10	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
0	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
-10	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
-20	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
-30	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
-40	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
-50	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
-60	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
-70	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3
-80	+11,3	+8,3	+4,3	+0,3	-3,3	-6,3	-8,3	-9,3	-10,3	-10,3	-10,3	-10,3	-9,3	-8,3	-6,3	-4,3	-2,3	+0,3	+2,3	+4,3	+6,3	+8,3	+10,3

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TABLE (23). Epoch 1900. Horizontal intensity T_e.

φ	λ = 0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	0,81	0,83*	0,79	0,74	0,67	0,61	0,52	0,45	0,44	0,42	0,44	0,43	0,41	0,38	0,32	0,23	0,25	0,26	0,35	0,43	0,56	0,66	0,75	0,81
+70	1,17	1,18	1,17	1,11	1,04	0,96	0,84	0,78	0,79	0,91	1,04	1,10	1,13	1,07	0,92	0,73	0,49	0,17	0,14	0,49	0,71*	0,84*	1,04*	0,98*
+60	1,49*	1,58*	1,63*	1,62*	1,55	1,48	1,40	1,38	1,45	1,64*	1,70	1,75	1,77	1,66	1,50	1,34	1,06	0,71	0,42	0,61*	0,90*	1,15	1,30	1,48*
+50	1,90*	1,99*	2,05*	2,13	2,16	2,14	2,08	2,17*	2,22*	2,30*	2,31	2,34*	2,23	2,15	2,05	1,88	1,68	1,40	1,13	1,14	1,35*	1,47	1,62	1,73
+40	2,36*	2,47*	2,57	2,65*	2,78	2,79*	2,80	2,78	2,81	2,82*	2,78	2,68	2,57	2,49	2,49	2,48	2,38	2,23	2,01	1,91*	1,93*	1,83	2,11*	2,21*
+30	2,71	2,87	3,02	3,19	3,34	3,43	3,45	3,41	3,33*	3,20*	3,07	2,96	2,84	2,80	2,82	2,91	2,91	2,88	2,80	2,58	2,43	2,31	2,35	2,33
+20	2,99	3,12	3,29	3,45	3,62	3,70	3,82*	3,72	3,68*	3,48	3,33	3,16	3,10	3,07	3,14	3,22	3,34	3,37	3,29	3,12	2,90	2,74	2,79*	2,82
+10	3,20*	3,23	3,31	3,43	3,55	3,81*	3,86	3,93*	3,82	3,71	3,58	3,44	3,40	3,38	3,41	3,43	3,58	3,62	3,56	3,30	3,02	2,93	2,97	3,07*
0	2,95	3,05*	3,04	3,17	3,33	3,52	3,71	3,83*	3,88	3,83	3,75	3,66	3,60	3,55	3,51	3,49	3,53	3,55	3,47	3,26	2,99	2,93	2,92	2,94
-10	2,62	2,58*	2,62	2,74	2,92	3,16	3,40	3,61	3,72	3,75	3,71	3,65	3,62	3,55	3,46	3,37	3,36	3,35	3,28	3,04	2,81	2,72	2,68	2,66
-20	2,29	2,24	2,24	2,32	2,42*	2,65	2,85	3,10	3,30	3,43	3,46	3,45	3,41	3,36	3,28	3,17	3,13	3,11	3,02	2,81	2,64	2,52	2,45	2,40
-30	2,12	1,96*	1,99	1,97	2,03	2,17	2,31	2,47	2,66	2,82	2,84*	2,97	3,03	3,03	2,98	2,93	2,89	2,85	2,82	2,74	2,56*	2,43	2,32	2,23
-40	2,03	1,89	1,81	1,75	1,72	1,76	1,84	1,91	1,97	2,05	2,23*	2,37	2,49	2,62	2,65	2,66	2,66	2,72	2,79	2,80	2,61*	2,50	2,39	2,18
-50	2,02	1,84	1,71	1,63	1,56	1,52	1,47	1,40	1,31	1,32	1,52	1,74	1,97	2,16	2,25	2,31	2,41	2,60	2,75	2,85	2,79	2,62	2,43	2,23
-60	2,09	1,88	1,73	1,55	1,43	1,32	1,18	0,97	0,78	0,73	0,88	1,14	1,39	1,60	1,79	1,93	2,14	2,37	2,60	2,76	2,76	2,63	2,48	2,29
-70	2,03	1,87	1,73	1,60	1,45	1,31	1,13	0,89	0,60	0,30	0,29	0,49	0,71	0,92	1,14	1,39	1,64	1,94	2,18	2,31	2,37	2,40	2,34	2,19
-80	1,76	1,69	1,59	1,49	1,37	1,22	1,08	0,91	0,73	0,56	0,44	0,38	0,44	0,60	0,84	1,03	1,26	1,45	1,61	1,77	1,85	1,86	1,87	1,85

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The values $\gamma' \gamma'$ without a star are the sum of the elements $\alpha' \alpha'$ of the magnetic maps for 1885 (see Publication I (pages 3-6) and the secular changes of our tables (46), (47), (48) Chapter II given below, multiplied by 15. The values which have a star on the right in (21), (22) and (23) are obtained using observations, which were made on the average four years before the epoch 1900 at 68 different locations. They are contained in the following documents. /16

1) G. W. Littlehales, the secular change in the direction of the terrestrial magnetic field, Washington, 1899.

2) C. Chree, report of the Kiev Observatory, committee for the year 1898, page 30-31.

3) Earth magnetic observations of the officers of the kaiser Austrian Navy ships, Zrini and Aurora, 1895-1898.

4) G. R. Putnan, report A magnetic pendulum observations made, 1896.

5) Meteorological publication, February 1894, page 76, August 1895, pages 297 and 298, May 1894, page 40, March 1893, page 22, July 1896, page 52, OETBR. 1894, page 394.

6) Magazine Terrestrial Magnetism April 1896, page 85 and March 1899, page 62.

7) H. Fritsche, Magnetic observations at 509 locations made in Europe between 1867-1894, pages 16-17, locations no. 126-130. The reduction of these measurements to the epoch 1900 was done using Tables (46), (47), (48) Chapter II. For the adjacent intersections of the meridians and the parallels, they were done using the tables given in Publication I pages 42-53, Tables 27, 28, 29. The values of the coefficients gh of the theory resulting from (21), (22) and (23) are found in Chapter I . The sine and cosines

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series for X_r, Y_r, Z_r as well as the quantities $X_r\ Y_r\ Z_r\ \delta_r\ i_r\ T_r$ and J_r which results from them are given in the following tables (24), (25), (26), (27), (28), (29), (30), (31), (32) and (33).

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TABLE (24). Epoch 1900.

u	K_0	K_1 cos λ	K_1 sin λ	K_2 cos 2λ	K_2 sin 2λ	K_3 cos 3λ	K_3 sin 3λ	K_4 cos 4λ	K_4 sin 4λ	K_5 cos 5λ	K_5 sin 5λ
10°	X_r=+0,311	+0,204	+0,359	+0,205	+0,034	−0,008	−0,005	+0,000	−0,001	+0,000	+0,000
20	X_r=+0,699	+0,025	+0,400	+0,327	+0,057	−0,023	−0,010	−0,003	−0,009	+0,000	+0,001
30	X_r=+1,194	−0,141	+0,451	+0,319	+0,072	−0,018	−0,003	−0,006	−0,018	+0,003	+0,005
40	X_r=+1,770	−0,307	+0,480	+0,192	+0,093	+0,012	+0,022	−0,005	−0,025	+0,005	+0,011
50	X_r=+2,351	−0,169	+0,460	+0,002	+0,127	+0,054	+0,054	+0,002	−0,020	+0,009	+0,015
60	X_r=+2,851	−0,109	+0,394	−0,169	+0,154	+0,078	+0,076	+0,015	−0,003	+0,009	+0,011
70	X_r=+3,207	−0,114	+0,311	−0,263	+0,149	+0,070	+0,074	+0,025	+0,012	+0,007	+0,002
80	X_r=+3,375	−0,128	+0,246	−0,269	+0,091	+0,046	+0,056	+0,025	+0,018	+0,003	−0,011
90	X_r=+3,340	−0,404	+0,205	−0,213	+0,002	+0,028	+0,033	+0,014	+0,013	−0,003	−0,019
100	X_r=+3,127	−0,556	+0,144	−0,139	−0,081	+0,028	+0,014	−0,001	+0,002	−0,007	−0,019
110	X_r=+2,799	−0,602	+0,001	−0,083	−0,123	+0,030	−0,004	−0,015	−0,004	−0,009	−0,010
120	X_r=+2,443	−0,507	−0,248	−0,047	−0,122	+0,008	−0,028	−0,019	−0,001	−0,007	−0,001
130	X_r=+2,131	−0,275	−0,542	−0,020	−0,103	−0,038	−0,058	−0,016	+0,006	−0,005	+0,005
140	X_r=+1,886	+0,059	−0,752	+0,010	−0,093	−0,034	−0,080	−0,009	+0,011	−0,003	+0,005
150	X_r=+1,588	+0,441	−0,785	+0,039	−0,098	−0,096	−0,077	−0,004	+0,010	−0,001	+0,003
160	X_r=+1,199	+0,801	−0,648	+0,053	−0,095	−0,067	−0,050	−0,001	+0,005	0,000	+0,001
170	X_r=+0,655	+1,064	−0,463	+0,039	−0,060	−0,029	−0,015	+0,000	+0,001	0,000	+0,000

TABLE (25). Epoch 1900.

u	L_1 cos λ	Z_1 sin λ	L_2 cos 2λ	Z_2 sin 2λ	L_3 cos 3λ	Z_3 sin 3λ	L_4 cos 4λ	Z_4 sin 4λ	L_5 cos 5λ	Z_5 sin 5λ
10°	Y_r=+0,351	−0,255	+0,035	−0,213	−0,094	+0,009	−0,001	+0,000	+0,000	+0,000
20	Y_r=+0,373	−0,190	+0,066	−0,389	−0,013	+0,029	−0,009	+0,004	+0,001	+0,000
30	Y_r=+0,404	−0,107	+0,090	−0,498	−0,018	+0,045	−0,025	+0,009	+0,006	−0,003
40	Y_r=+0,441	−0,033	+0,115	−0,530	−0,007	+0,039	−0,043	+0,014	+0,016	−0,007
50	Y_r=+0,477	+0,015	+0,146	−0,490	+0,020	+0,009	−0,059	+0,014	+0,028	−0,013
60	Y_r=+0,509	+0,042	+0,185	−0,399	+0,057	−0,033	−0,061	+0,005	+0,039	−0,021
70	Y_r=+0,536	+0,058	+0,231	−0,285	+0,095	−0,073	−0,052	−0,010	+0,043	−0,027
80	Y_r=+0,559	+0,064	+0,262	−0,174	+0,126	−0,100	−0,038	−0,028	+0,036	−0,030
90	Y_r=+0,589	+0,138	+0,276	−0,086	+0,148	−0,117	−0,022	−0,041	+0,022	−0,030
100	Y_r=+0,631	+0,226	+0,266	−0,026	+0,162	−0,134	−0,020	−0,046	+0,004	−0,026
110	Y_r=+0,676	−0,346	+0,239	+0,015	+0,173	−0,157	−0,022	−0,042	−0,009	−0,019
120	Y_r=+0,711	+0,490	+0,209	+0,039	+0,179	−0,183	−0,027	−0,033	−0,015	−0,013
130	Y_r=+0,713	+0,645	+0,184	+0,062	+0,172	−0,199	−0,029	−0,020	−0,014	−0,007
140	Y_r=+0,671	+0,793	+0,167	+0,076	+0,143	−0,187	−0,023	−0,010	−0,010	−0,003
150	Y_r=+0,588	+0,941	+0,148	+0,080	+0,106	−0,143	−0,013	−0,003	−0,004	−0,001
160	Y_r=+0,789	+1,058	+0,114	+0,069	+0,057	−0,079	−0,005	+0,000	−0,001	0,000
170	Y_r=+0,409	+1,133	+0,065	+0,034	+0,016	−0,023	−0,001	+0,000	+0,000	0,000

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TABLE 6). ℓ_n. 196a

ω		m_0	m_1 $\sin\lambda$	M_1 $\cos\lambda$	m_2 $\sin 2\lambda$	M_2 $\cos 2\lambda$	m_3 $\sin 3\lambda$	M_3 $\cos 3\lambda$	m_4 $\sin 4\lambda$	M_4 $\cos 4\lambda$	m_5 $\sin 5\lambda$	M_5 $\cos 5\lambda$
10°	Z_n =	+5,542	−0,252	−0,060	−0,032	−0,010	+0,004	+0,002	+0,000	+0,000	+0,000	+0,000
20	Z_n =	+5,523	−0,369	−0,144	−0,093	−0,037	+0,025	+0,014	+0,001	+0,005	+0,001	−0,001
30	Z_n =	+5,381	−0,308	−0,275	−0,138	−0,062	+0,054	+0,029	+0,008	+0,019	−0,002	−0,005
40	Z_n =	+5,014	−0,149	−0,455	−0,217	−0,088	+0,068	+0,031	+0,016	+0,044	−0,006	−0,014
50	Z_n =	+4,365	−0,014	−0,657	−0,254	−0,134	+0,040	+0,003	+0,020	+0,068	−0,013	−0,030
60	Z_n =	+3,443	+0,019	−0,836	−0,645	−0,213	−0,025	−0,051	+0,015	+0,077	−0,023	−0,046
70	Z_n =	+2,304	−0,027	−0,962	−0,448	−0,320	−0,091	−0,115	−0,007	+0,067	−0,031	−0,053
80	Z_n =	+1,043	−0,044	−1,046	−0,225	−0,412	−0,134	−0,165	−0,034	+0,044	−0,036	−0,046
90	Z_n =	−0,335	+0,061	−1,136	−0,060	−0,447	−0,148	−0,193	−0,055	+0,024	−0,036	−0,026
100	Z_n =	−1,421	+0,324	−1,264	+0,035	−0,402	−0,164	−0,209	−0,062	+0,018	−0,030	−0,002
110	Z_n =	−2,428	+0,695	−1,354	−0,076	−0,326	−0,157	−0,221	−0,053	+0,025	−0,021	+0,015
120	Z_n =	−3,234	+1,081	−1,420	+0,095	−0,245	−0,237	−0,225	−0,035	+0,033	−0,013	+0,026
130	Z_n =	−3,911	+1,384	−1,279	+0,110	−0,196	−0,252	−0,207	−0,018	+0,034	−0,005	+0,026
140	Z_n =	−4,534	+1,525	−0,881	+0,115	−0,163	−0,215	−0,159	−0,006	+0,024	−0,002	+0,008
150	Z_n =	−5,167	+1,454	−0,433	+0,100	−0,134	−0,132	−0,091	−0,002	+0,011	−0,000	+0,003
160	Z_n =	−5,773	+1,147	−0,092	+0,059	−0,079	−0,051	−0,034	−0,001	+0,003	−0,000	+0,001
170	Z_n =	−6,232	+0,636	+0,040	+0,018	−0,024	−0,008	−0,004	−0,000	+0,000	−0,000	+0,000

TABLE (27) epoch 1900. Northern component X_r according to theory. For $\varphi = +90$ we have $\delta_r = 50°46' - \lambda$, $X_r = 0{,}4342 \cos\delta_r$, $Y_r = 0{,}4342 \sin\delta_r$ for $\varphi = -90°$ we have $\delta_r = \lambda + 18°2'$, $X_r = 4{,}219 \cos\delta_r$, $Y_r = 1{,}219$. The values of X_r without sine are positive.

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	0,281	0,360	0,415	0,442	0,438	0,405	0,344	0,260	0,157	0,045	-0,074	-0,182	-0,281	-0,360	-0,415	-0,442	-0,438	-0,405	-0,344	-0,260	-0,157	-0,045	0,071	0,182
+80	0,712	0,785	0,793	0,745	0,660	0,561	0,470	0,407	0,380	0,377	0,383	0,371	0,320	0,225	0,089	-0,055	-0,182	-0,259	-0,258	-0,177	-0,022	0,177	0,387	0,575
+70	1,025	1,107	1,116	1,068	0,974	0,866	0,780	0,750	0,790	0,886	0,990	1,051	1,021	0,895	0,692	0,450	0,214	0,036	-0,042	0,008	0,170	0,404	0,654	0,871
+60	1,351	1,459	1,501	1,496	1,452	1,386	1,328	1,322	1,398	1,530	1,659	1,715	1,663	1,515	1,303	1,048	0,780	0,548	0,410	0,404	0,522	0,726	0,961	1,179
+50	1,767	1,918	2,011	2,057	2,072	2,064	2,042	2,052	2,092	2,187	2,259	2,257	2,147	1,998	1,843	1,679	1,486	1,276	1,104	1,026	1,054	1,177	1,359	1,561
+40	2,249	2,449	2,581	2,664	2,727	2,767	2,772	2,753	2,741	2,738	2,703	2,603	2,461	2,351	2,307	2,283	2,225	2,093	1,930	1,787	1,703	1,706	1,813	2,013
+30	2,675	2,905	3,066	3,177	3,247	3,290	3,344	3,328	3,251	3,145	3,010	2,853	2,719	2,667	2,714	2,803	2,867	2,828	2,706	2,528	2,333	2,219	2,250	2,423
+20	2,932	3,151	3,328	3,466	3,588	3,687	3,734	3,705	3,598	3,440	3,260	3,059	2,906	2,929	3,078	3,196	3,302	3,335	3,256	3,067	2,816	2,626	2,590	2,715
+10	2,952	3,128	3,298	3,467	3,624	3,755	3,848	3,825	3,816	3,677	3,508	3,322	3,170	3,208	3,350	3,508	3,615	3,698	3,543	3,490	3,307	3,057	2,841	2,760
0	2,762	2,862	3,019	3,206	3,393	3,563	3,720	3,839	3,873	3,810	3,687	3,580	3,520	3,488	3,461	3,450	3,467	3,479	3,414	3,293	3,083	2,838	2,751	2,781
-10	2,452	2,479	2,590	2,765	2,957	3,158	3,376	3,584	3,719	3,743	3,678	3,593	3,522	3,459	3,388	3,329	3,293	3,252	3,154	2,994	2,819	2,675	2,572	2,577
-20	2,120	2,081	2,133	2,255	2,418	2,621	2,862	3,109	3,296	3,383	3,379	3,333	3,282	3,231	3,177	3,127	3,068	2,991	2,872	2,735	2,606	2,491	2,378	2,335
-30	1,871	1,760	1,737	1,787	1,899	2,051	2,250	2,459	2,630	2,749	2,817	2,856	2,883	2,902	2,907	2,893	2,848	2,779	2,692	2,611	2,530	2,419	2,351	2,354
-40	1,777	1,590	1,484	1,453	1,481	1,554	1,656	1,764	1,871	1,985	2,120	2,270	2,413	2,536	2,606	2,635	2,629	2,614	2,614	2,628	2,615	2,515	2,396	2,434
-50	1,839	1,585	1,404	1,292	1,231	1,200	1,180	1,170	1,189	1,278	1,438	1,663	1,895	2,085	2,204	2,278	2,317	2,334	2,514	2,648	2,783	2,664	2,474	2,451
-60	1,967	1,614	1,448	1,264	1,110	0,972	0,840	0,726	0,666	0,698	0,834	1,048	1,279	1,476	1,648	1,724	1,844	2,016	2,250	2,434	2,665	2,682	2,538	2,498
-70	1,985	1,727	1,467	1,224	0,992	0,765	0,548	0,357	0,238	0,188	0,235	0,359	0,517	0,677	0,827	0,986	1,182	1,439	1,742	2,039	2,288	2,502	2,370	2,273
-80	1,736	1,541	1,298	1,025	0,736	0,445	0,168	-0,075	-0,266	-0,397	-0,442	-0,425	-0,348	-0,221	-0,059	0,165	0,430	0,735	1,064	1,379	1,644	1,821	1,892	1,845
-90	1,139	1,093	0,815	0,553	0,253	-0,064	-0,377	-0,665	-0,906	-1,087	-1,193	-1,217	-1,159	-1,032	-0,815	-0,553	-0,253	0,064	0,377	0,665	0,906	1,087	1,193	1,217

TABLE (28) epoch 1900. Western component Y_r according to theory. Units of the 3rd decimal.

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	+344	+260	+157	+45	-71	-182	-281	-360	-415	-442	-438	-405	-344	-260	-157	-45	+71	+182	+281	+360	+415	+442	+438	+405
+80	+381	+200	+12	-135	-243	-294	-300	-270	-233	-211	-221	-260	-313	-352	-353	-289	-159	+22	+228	+422	+567	+639	+623	+532
+70	+418	+185	-41	-221	-335	-356	-294	-176	-53	+13	-17	-135	-304	-461	-553	-539	-403	-160	+144	+448	+675	+783	+759	+623
+60	+457	+205	-30	-220	-339	-359	-270	-93	+93	+186	+126	-71	-327	-555	-702	-726	-605	-335	+40	+427	+719	+860	+839	+685
+50	+522	+264	+19	-171	-295	-326	-237	-40	+177	+277	+177	-80	-378	-613	-757	-803	-719	-470	-79	+352	+693	+869	+873	+744
+40	+612	+343	+89	-102	-224	-270	-212	-28	+184	+272	+135	-155	-438	-616	-709	-760	-736	-554	-198	+232	+600	+826	+893	+815
+30	+729	+444	+165	-24	-141	-205	-192	-57	+125	+190	+39	-248	-481	-576	-605	-652	-683	-583	-300	+85	+451	+730	+893	+900
+20	+853	+556	+255	+57	-60	-144	-179	-106	+28	+63	-87	-334	-495	-510	-485	-523	-534	-574	-387	-80	+270	+611	+881	+984
+10	+945	+657	+355	+154	+32	-74	-146	-130	-51	-60	-201	-397	-497	-463	-405	-426	-510	-544	-454	-236	+88	+484	+851	+1035
0	+1003	+751	+469	+271	+140	+17	-77	-105	-98	-147	-293	-451	-509	-457	-387	-391	-466	-515	-517	-385	-74	+371	+815	+1061
-10	+1043	+829	+589	+406	+268	+146	+48	-14	-76	-200	-371	-513	-551	-495	-429	-418	-480	-572	-620	-520	-204	+292	+783	+1053
-20	+1057	+901	+708	+547	+417	+309	+223	+135	-3	-207	-432	-587	-623	-567	-492	-473	-537	-659	-745	-657	-313	+221	+790	+1037
-30	+1057	+953	+807	+679	+576	+496	+424	+314	+112	-173	-461	-647	-693	-637	-563	-547	-632	-788	-896	-793	-420	+149	+685	+1003
-40	+1026	+985	+892	+803	+735	+687	+624	+491	+239	-105	-440	-657	-716	-667	-606	-621	-749	-937	-1050	-933	-537	+39	+578	+949
-90	+954	+985	+953	+910	+879	+853	+793	+641	+367	+61	-341	-573	-666	-659	-651	-712	-843	-1071	-1173	-1047	-661	-112	+415	+783

Dr. Fritsche: Erdmagnetismus 1550 - 1915.

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TABLE (28) epoch 1900 Western component Y_r according to theory. Units of the 3rd decimal
Dr. Fritsche, Earth magnetism 1550–1915

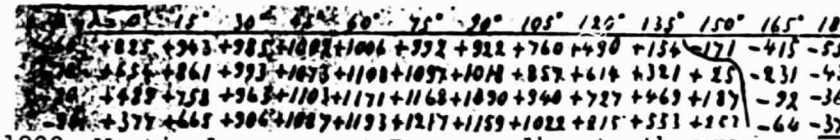

TABLE (29) epoch 1900. Vertical component Z_r according to theory. For $\varphi = +90°$ $Z_r = +5.534$, for $\varphi = -90°$ $Z_r = -6.406$.

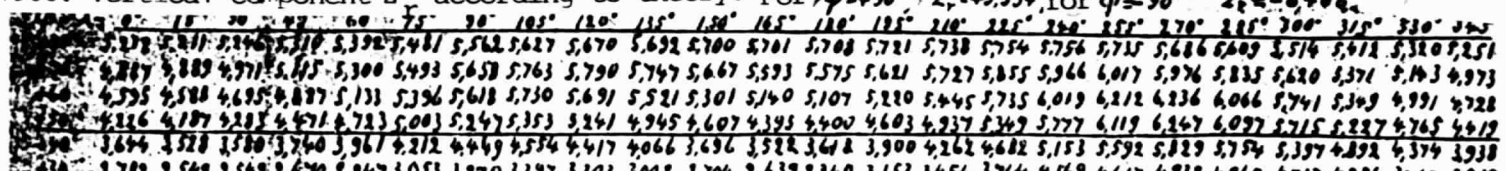

TABLE (30) epoch 1900. Declination δ_r according to theory. Degrees in mins. are given by points

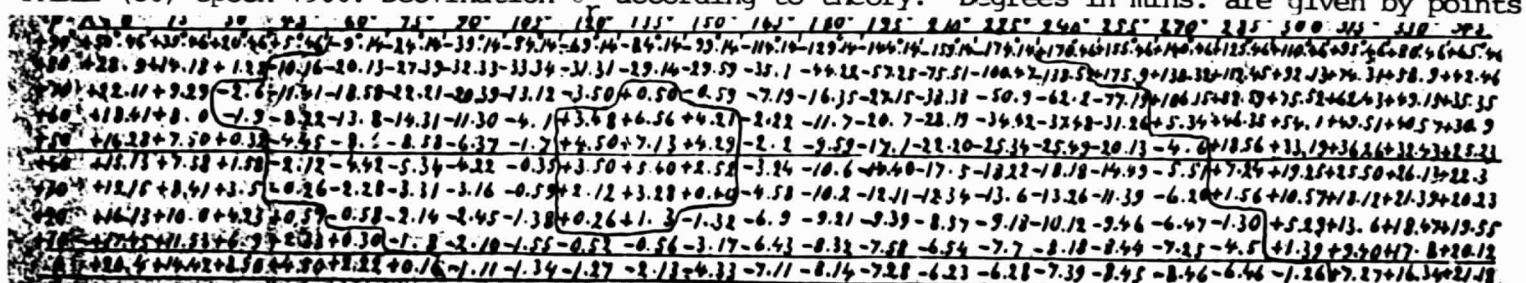

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TABLE (30) epoch 1900. Declination δ_r according to theory. Degrees in mins. are separated by pts.

φ	λ = 0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
-10°	+23.3	+18.30	+12.45	+8.21	+5.11	+2.39	+0.49	-0.14	-1.10	-3.9	-5.46	-8.7	-8.54	-8.9	-7.13	-7.9	-8.18	-9.39	-11.7	-9.57	-9.8	+6.34	+6.36	+6.29
-20	+24.30	+23.25	+18.22	+13.38	+9.47	+6.43	+4.27	+2.29	-0.3	-3.30	-7.17	-9.53	-10.45	-9.57	-8.48	-8.36	-9.56	-12.25	-14.32	-13.38	-6.51	+5.44	+7.20	+9.33
-30	+29.28	+28.26	+24.55	+20.48	+16.56	+13.36	+10.40	+7.17	+3.24	-3.36	-9.12	-12.46	-13.31	-12.23	-10.58	-10.42	-12.30	-15.50	-18.24	-17.0	-9.25	+3.31	+6.54	+8.2
-40	+30.0	+31.47	+31.1	+28.55	+26.24	+23.5	+20.39	+15.33	+7.17	-3.2	-11.44	-16.9	-16.31	-14.46	-13.6	-13.16	-15.54	-19.43	-21.53	-19.35	-11.34	+0.53	+4.4	+7.24
-50	+27.25	+31.8	+34.10	+35.9	+35.32	+35.24	+33.54	+28.43	+17.9	+0.16	-13.20	-19.1	-19.32	-17.32	-16.27	-17.24	-20.39	-24.6	-25.0	-21.34	-13.39	-2.24	+5.36	+8.0
-60	+22.45	+29.15	+34.13	+38.25	+42.11	+45.35	+47.40	+46.19	+36.20	+11.26	-11.35	-21.36	-23.27	-22.57	-23.11	-25.20	-28.25	-30.13	-28.56	-24.4	-16.7	-6.8	+4.29	+9.26
-70	+18.14	+26.30	+34.6	+41.14	+48.10	+55.6	+61.42	+67.16	+69.28	+59.38	+6.9	-32.45	-40.9	-41.38	-42.23	-43.10	-42.58	-40.33	-35.42	-28.49	-20.15	-10.35	-0.39	+5.9
-80	+15.44	+26.12	+36.34	+47.6	+57.5	+69.3	+81.14	+94.34	+110.6	+123.43	+137.4	-116.47	-133.57	-102.59	-93.35	-80.50	-69.46	-59.23	-48.58	-38.19	-27.35	-16.46	-5.46	+5.6
-90	+18.2	+33.2	+48.2	+63.2	+78.2	+93.2	+108.2	+123.2	+138.2	+153.2	+168.2	-176.58	-161.58	-146.58	-131.58	-116.58	-101.58	-86.58	-71.58	-56.58	-41.58	-26.58	-11.58	+3.2

TABLE (31) epoch 1900. Inclination I_r according to theory. For $\varphi = +90°$, $i_r = +85°25'$, for $\varphi = -90°$ $i_r = -79°14'$, Degrees in mins. are separated by dots. Values without sine are pos.

φ	λ = 0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	81.12	81.10	81.24	81.53	82.34	83.24	84.16	85.2	85.30	85.40	85.34	85.27	85.31	85.49	86.22	87.4	87.36	87.24	86.32	85.20	84.7	83.1	82.9	81.20
+70	77.14	77.4	77.20	77.58	79.0	80.20	81.37	82.23	82.13	81.14	80.5	79.16	79.11	79.51	81.12	83.10	85.38	88.26	88.34	85.36	82.56	80.41	78.59	77.51
+60	72.45	72.12	72.16	72.48	73.48	75.8	76.26	76.58	76.10	74.24	72.35	71.32	71.39	72.50	74.48	77.28	80.41	84.6	84.13	84.28	81.12	78.7	75.42	73.55
+50	66.26	65.11	64.31	65.13	66.6	67.20	68.36	69.7	68.10	65.58	63.49	62.51	63.39	65.34	68.1	70.49	74.3	77.28	79.57	79.55	77.33	74.22	71.17	68.34
+40	57.24	54.58	54.12	54.31	55.22	56.34	58.0	58.51	58.7	55.55	53.47	53.33	55.22	58.5	60.29	62.45	65.33	68.50	71.35	72.37	71.30	68.49	65.12	61.8
+30	45.6	40.57	39.37	40.3	41.3	42.23	44.8	45.35	45.26	43.37	41.56	42.40	45.48	49.8	51.10	52.36	54.48	57.29	61.6	63.5	63.16	61.24	57.13	51.14
+20	29.13	23.41	20.31	21.3	22.16	23.51	26.12	28.30	29.13	28.8	27.14	29.8	33.20	37.2	38.34	39.16	41.0	44.17	47.59	51.4	52.42	51.46	46.58	38.34
+10	1.25	1.31	-1.32	-1.9	0.5	1.51	4.34	7.30	9.2	8.54	9.6	11.52	16.36	20.34	21.46	22.8	23.40	27.5	31.33	36.7	39.37	39.49	36.19	31.11
0	-9.8	-19.7	-22.56	-23.8	-22.13	-20.33	-17.52	-14.52	-12.57	-12.15	-11.11	-8.5	-5.39	-0.6	1.24	1.59	3.31	6.56	12.4	18.25	24.5	25.27	19.9	5.38
-10°	-26.19	-35.58	-40.12	-41.9	-40.45	-39.29	-37.20	-34.58	-33.17	-32.10	-30.35	-27.38	-23.53	-20.43	-18.59	-18.2	-16.38	-13.36	-8.10	-0.19	7.28	9.37	8.24	4.50
-20°	-39.3	-47.50	-52.22	-54.8	-54.25	-53.41	-52.18	-50.50	-49.44	-48.37	-46.51	-44.4	-40.47	-37.54	-35.58	-34.44	-33.27	-31.42	-25.14	-16.49	-8.17	-5.44	-5.0	-2.18
-30°	-52.32	-55.25	-60.8	-62.35	-63.37	-63.35	-63.5	-62.50	-62.27	-61.31	-59.36	-56.43	-53.31	-50.43	-48.47	-47.38	-46.8	-43.45	-37.43	-29.29	-21.30	-19.8	-15.25	-3.38
-40°	-62.41	-69.37	-64.22	-67.18	-69.1	-70.0	-70.44	-71.30	-71.58	-71.23	-69.18	-66.14	-63.2	-60.21	-58.30	-57.16	-55.40	-51.25	-46.55	-39.31	-32.57	-30.44	-35.16	-43.51
-50°	-56.23	-62.3	-66.19	-69.25	-71.36	-73.24	-75.10	-77.5	-78.36	-78.38	-76.44	-73.44	-70.42	-68.7	-66.40	-65.20	-63.28	-60.2	-54.52	-48.47	-43.42	-41.5	-44.20	-49.5
-60°	-60.21	-64.15	-67.42	-70.23	-72.51	-75.5	-77.28	-80.4	-82.3	-83.45	-82.17	-80.10	-77.42	-75.40	-74.5	-72.30	-70.12	-66.43	-62.27	-57.35	-54.16	-52.41	-52.34	-56.28
-70°	-65.39	-67.49	-70.6	-72.17	-74.25	-76.34	-78.54	-81.27	-84.11	-86.47	-88.0	-86.25	-84.28	-82.25	-80.32	-78.26	-75.53	-72.50	-69.36	-66.31	-64.7	-62.48	-62.45	-63.41
-80°	-72.6	-72.59	-74.6	-75.23	-76.48	-78.12	-79.55	-81.34	-83.13	-84.45	-85.55	-86.21	-85.42	-84.36	-83.2	-81.15	-79.22	-77.26	-75.34	-73.56	-72.38	-71.47	-71.23	-71.38

TABLE (32) epoch 1900. Horiz. intensity T_r according to theory.. For $\varphi = +90°$ $T_r = 0,444$ for $\varphi = -90°$ $T_r = 1,219$

φ	λ = 0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	0,398	0,810	0,793	0,757	0,703	0,633	0,558	0,488	0,444	0,432	0,442	0,453	0,448	0,418	0,364	0,294	0,242	0,266	0,346	0,458	0,567	0,663	0,733	0,783
+70	1,107	1,122	1,117	1,091	1,058	0,936	0,833	0,770	0,792	0,886	0,990	1,060	1,065	1,007	0,886	0,702	0,556	0,464	0,458	0,548	0,696	0,821	0,902	1,071
+60	1,426	1,473	1,501	1,512	1,49	1,432	1,355	1,325	1,401	1,541	1,664	1,717	1,695	1,613	1,480	1,275	0,987	0,692	0,612	0,593	0,859	1,185	1,372	1,363
+50	1,842	1,936	2,011	2,064	2,093	2,096	2,058	2,043	2,093	2,206	2,266	2,254	2,180	2,091	1,992	1,861	1,651	1,366	1,107	1,085	1,281	1,546	1,755	1,738

TABLE (32) epoch 1900. Horiz. intensity T_r calculated according to theory.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	2,331	2,473	2,583	2,664	2,737	2,780	2,7[illegible]	2,753	2,747	2,751	2,706	2,608	2,500	2,430	2,413	2,411	2,343	2,165	1,948	1,802	1,806	1,895	2,021	2,172
+30	2,773	2,938	3,070	3,177	3,270	3,346	3,376	3,329	3,253	3,151	3,010	2,864	2,761	2,728	2,780	2,878	2,994	2,887	2,723	2,521	2,376	2,336	2,421	2,585
+20	3,054	3,199	3,338	3,467	3,588	3,690	3,738	3,707	3,598	3,441	3,261	3,117	3,044	3,042	3,116	3,238	3,355	3,384	3,279	3,062	2,829	2,696	2,736	2,898
+10	3,100	3,190	3,317	3,470	3,624	3,756	3,850	3,877	3,816	3,678	3,514	3,395	3,341	3,340	3,374	3,442	3,533	3,585	3,519	3,315	3,053	2,882	2,888	2,998
0	2,946	2,959	3,058	3,217	3,386	3,563	3,720	3,847	3,873	3,812	3,699	3,608	3,556	3,518	3,483	3,473	3,498	3,520	3,455	3,266	3,023	2,862	2,860	2,951
-10	2,644	2,614	2,678	2,794	2,969	3,162	3,376	3,584	3,720	3,768	3,697	3,630	3,564	3,494	3,415	3,355	3,328	3,301	3,214	3,038	2,826	2,691	2,688	2,792
-20	2,369	2,268	2,247	2,328	2,453	2,639	2,871	3,112	3,296	3,389	3,406	3,384	3,340	3,280	3,214	3,162	3,115	3,063	2,968	2,813	2,625	2,501	2,484	2,566
-30	2,149	2,001	1,915	1,912	1,977	2,111	2,296	2,479	2,633	2,755	2,854	2,929	2,965	2,971	2,964	2,944	2,917	2,889	2,837	2,730	2,564	2,423	2,357	2,386
-40	2,032	1,871	1,731	1,660	1,653	1,699	1,770	1,831	1,886	1,988	2,165	2,363	2,517	2,616	2,676	2,709	2,733	2,777	2,817	2,789	2,670	2,515	2,371	2,332
-50	2,078	1,863	1,697	1,580	1,513	1,472	1,422	1,334	1,245	1,272	1,478	1,759	2,009	2,187	2,298	2,381	2,476	2,622	2,776	2,847	2,808	2,666	2,489	2,399
-60	2,133	1,930	1,751	1,613	1,498	1,389	1,247	1,051	0,827	0,715	0,851	1,127	1,394	1,603	1,760	1,907	2,037	2,333	2,571	2,731	2,775	2,698	2,561	2,346
-70	2,096	1,930	1,771	1,628	1,487	1,338	1,156	0,929	0,656	0,372	0,236	0,427	0,676	0,904	1,120	1,352	1,604	1,894	2,147	2,338	2,439	2,444	2,371	2,246
-80	1,803	1,718	1,616	1,506	1,383	1,250	1,103	0,943	0,774	0,611	[illegible]	[illegible]	0,501	0,647	0,833	1,036	1,244	1,443	1,620	1,758	1,855	1,901	1,902	1,868

TABLE (33) epoch 1900. Total intensity J_r according to theory For $\varphi = +90°$ $\lambda = 3,551$ for $\varphi = -90°$ $\lambda = 4,521$

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	5,274	5,279	5,305	5,364	5,438	5,518	5,590	5,648	5,687	5,708	5,717	5,719	5,725	5,737	5,750	5,762	5,761	5,740	5,696	5,630	5,564	5,493	5,396	5,309
+70	5,011	5,016	5,095	5,229	5,400	5,572	5,720	5,813	5,844	5,814	5,758	5,692	5,675	5,711	5,794	5,897	5,984	6,020	5,977	5,852	5,662	5,494	5,296	5,086
+60	4,812	4,818	4,928	5,116	5,346	5,583	5,780	5,880	5,861	5,732	5,556	5,420	5,[illegible]	5,464	5,693	5,875	6,000	6,245	6,249	6,034	5,807	5,566	5,151	4,920
+50	4,610	4,613	4,732	4,925	5,165	5,421	5,635	5,729	5,645	5,415	5,133	4,940	4,909	5,055	5,325	5,669	6,008	6,269	6,345	6,193	5,852	5,427	5,032	4,798
+40	4,426	4,408	4,474	4,593	4,814	5,068	5,297	5,421	5,401	4,910	4,580	4,390	4,397	4,595	4,898	5,266	5,664	5,997	6,143	6,030	5,690	5,247	4,818	4,597
+30	3,928	3,890	3,986	4,150	4,335	4,510	4,695	4,756	4,637	4,352	4,047	3,894	3,961	4,169	4,434	4,738	5,101	5,446	5,634	5,568	5,282	4,879	4,[illegible]	4,[illegible]
+20	3,498	3,467	3,564	3,714	3,878	4,035	4,167	4,218	4,123	3,902	3,668	3,563	3,647	3,811	3,986	4,182	4,445	4,727	4,900	4,873	4,668	4,357	4,010	3,674
+10	3,151	3,192	3,318	3,471	3,624	3,737	3,863	3,910	3,864	3,783	3,559	3,470	3,492	3,564	3,633	3,715	3,858	4,026	4,130	4,104	3,964	3,752	3,497	3,242
0	2,978	3,132	3,318	3,499	3,669	3,805	3,909	3,974	3,975	3,901	3,770	3,664	3,562	3,518	3,483	3,475	3,504	3,546	3,573	3,443	3,312	3,170	3,025	2,936
-10	2,972	3,231	3,478	3,711	3,919	4,096	4,244	4,334	4,449	4,428	4,294	4,097	3,899	3,735	3,612	3,529	3,476	3,397	3,247	3,038	2,850	2,729	2,691	2,791
-20	3,054	3,378	3,680	3,960	4,218	4,458	4,696	4,927	5,039	5,127	4,982	4,710	4,412	4,157	3,972	3,848	3,733	3,562	3,381	2,939	2,653	2,514	2,569	2,749
-30	3,183	3,524	3,847	4,150	4,449	4,736	5,085	5,430	5,631	5,776	5,639	5,337	4,987	4,651	4,494	4,358	4,208	3,965	3,587	3,136	2,756	2,565	2,609	2,845
-40	3,385	3,699	4,003	4,301	4,616	4,966	5,365	5,772	6,035	6,124	6,126	5,869	5,549	5,289	5,123	5,005	4,846	4,559	4,126	3,615	3,175	2,926	2,912	3,095
-50	3,742	3,975	4,226	4,494	4,794	5,150	5,554	5,965	6,292	6,458	6,437	6,278	6,076	5,909	5,801	5,706	5,542	5,250	4,913	4,321	3,875	3,580	3,480	3,555
-60	4,311	4,341	4,444	4,827	5,086	5,3[illegible]	5,795	6,091	6,381	6,563	6,630	6,604	6,502	6,477	6,421	6,342	6,189	5,927	5,560	5,162	4,[illegible]	4,[illegible]	4,[illegible]	4,[illegible]
-70	5,070	5,112	5,205	5,348	5,535	5,7[illegible]	6,002	6,249	6,470	6,640	6,75[illegible]	6,817	6,894	6,849	6,812	6,745	6,616	6,421	6,162	5,868	5,587	5,347	5,180	5,085
-80	5,870	5,870	5,902	5,968	6,060	6,[illegible]	6,304	6,434	6,557	6,666	6,755	6,819	6,861	6,872	6,861	6,817	6,737	6,631	6,498	6,355	6,213	6,091	5,977	5,906

The differences between calculation (Tables (30), (31), (32)) and observations (Tables (21), (22), (23)) are given in the following tables (34), (35), (36).

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TABLE (34) epoch 1900. Differences between the declination δ_r and the observations according to Table (30 and (illegible)

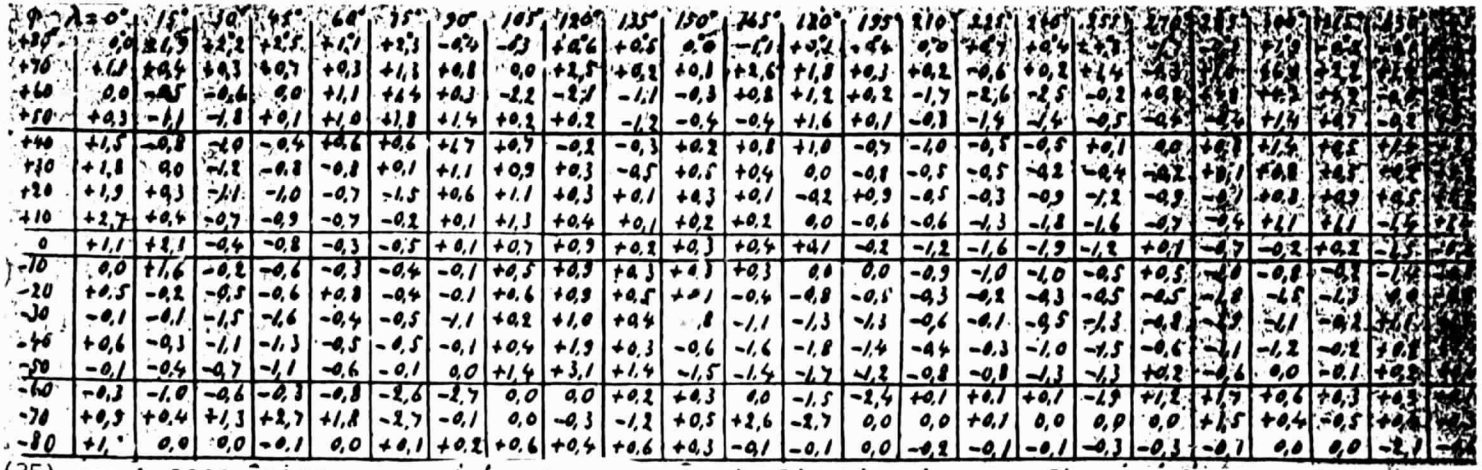

TABLE (35) epoch 1900. Difference $i_r - i_b$ between the inclination i_r according to theory and the observations i_b

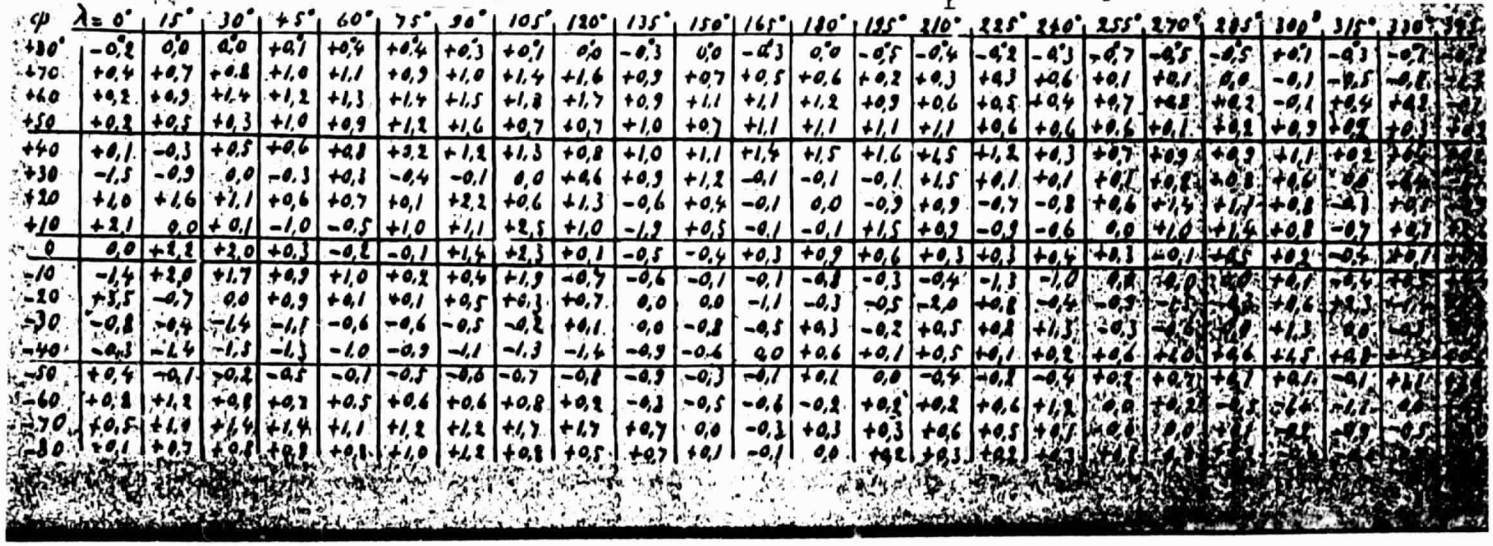

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TABLE (36). Differences $T_r - T_i$ between the horizontal intensity T_r according to theory and the observed T_i Epoch 1900. Gauss units of the 2nd decimal

φ	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345
+80°	0	-2	0	+2	+3	+2	+4	+4	+1	+1	0	+2	+4	+4	+4	+6	-1	0	-1	+3	+1	0	-2	-3
+70	-6	-6	-5	-2	-1	-2	-1	-1	0	-2	-5	-4	-6	-6	-3	-3	-3	-1	+1	-4	-1	+4	-4	+5
+60	-6	-11	-13	-11	-6	-5	-4	-5	-5	-10	-4	-3	-7	-5	-2	-6	-7	-7	-1	-2	-1	-2	-3	-12
+50	-6	-5	-4	-7	-7	-5	-2	-13	-12	-10	-4	-9	-5	-6	-6	-2	-3	-4	-2	-5	-9	-1	0	0
+40	-3	0	+1	0	-4	-1	-2	-3	-6	-7	-7	-7	-7	-6	-8	-7	-4	-7	-7	-11	-12	+6	-9	-4
+30	+6	+7	+5	-1	-7	-8	-8	-8	-8	-5	-6	-10	-8	-7	-4	-3	+3	+1	-8	-6	-5	+3	+7	+5
+20	+6	+8	+5	+2	-3	-1	-8	-1	-8	-4	-7	-4	-5	-3	-2	+2	+1	+1	-1	-6	-7	-4	-5	+7
+10	-10	-4	+1	+4	+7	-5	-1	-5	0	-3	-7	-4	-5	-4	-4	+1	-5	-3	-4	+1	+3	-5	-8	-7
0	-1	-9	+2	+5	+7	+4	+1	+1	-1	-2	-5	-5	-4	-3	-3	-2	-3	-3	-1	+1	+3	-7	-6	-2
-10	+4	+3	+4	+5	+5	0	-2	-3	0	0	-1	-2	-6	-6	-5	-1	-3	-5	-7	0	+2	-3	+1	+5
-20	+8	+3	+1	0	+3	-1	+2	+1	0	-4	-5	-7	-7	-8	-7	-1	-1	-5	-5	0	-1	-2	+3	+6
-30	+3	+4	-7	-6	-5	-6	-2	+1	-3	-6	+1	-4	-6	-6	-2	+1	+3	+4	+2	-1	0	-1	+4	+6
-40	+2	-2	-8	-9	-7	-6	-7	-8	-8	-6	-6	-1	+3	0	+3	+5	+7	+6	+3	-1	+6	+1	+6	+5
-50	+5	+2	-1	-5	-5	-5	-5	-7	-6	-5	-4	+2	+2	+3	+5	+7	+7	+2	+2	0	+1	+5	+6	+6
-60	+4	+5	+2	+6	+7	+7	+7	+8	+5	-1	-3	-1	0	0	-3	-2	-4	-4	-3	-3	+1	+7	+6	+6
-70	+6	+6	+4	+3	+4	+3	+3	+4	+6	+7	-5	-6	-3	-2	-2	-4	-3	-5	-3	+3	+7	+4	+3	+6
-80	+4	+3	+3	+2	+1	+3	+2	+3	+4	+5	+4	+5	+6	+5	-1	+1	-2	-1	+1	-1	0	+4	+3	+2

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According to the average of 264 points between the latitude +50° and -50° and longitude 0° to 360° according to Table (34), we have $\delta_r - \delta_t = \pm 0.74 = \pm 44'.4$. Also, according to Table (35), the average of 408 points uniformly distributed over the entire Earth's surface result in the value $i_r - i_t = \pm 0.66 = \pm 39'.6$. Finally, the average of all of these differences of Table (36) becomes $T_r - T_t = \pm 0.041$ or 2% of T. Almost the same deviations between theory and observation were obtained earlier by me for epochs 1842 and 1885. I also am giving the geographic position of the magnetic Earth's poles for the epochs 1550 and 1900 which I calculated using Tables (13), (14), (27), (28). /23

	Epoch. 1550 φ'	λ		Epoch 1900 φ'	λ
magnetic North Pole	+76° 18'	241° 54'	mag N.Pole	+69° 18'	263° 33'
" South Pole	-81 26	205 30	" S.Pole	-74 0	155 15

d. Earth magnetic elements for the epoch 1915

The Earth magnetic elements for the epoch 1915 which are given in the following tables (37), (38), (39) I obtained by adding the observed elements of epochs 1900 (Tables (21), (22), (23)) to the calculated theoretical difference between epochs 1900 and 1885. If one wishes to interpolate any magnetic elements between 1885 and 1900 and beyond, then one can use the yearly secular changes given in Chapter II in Tables (41), (42), (43), (44), (45), (46), (47), (48), (49), which follow from epochs 1842 and 1885. This is because the secular changes between 1885 and 1900 are very close to the ones between 1842 and 1885. For 1900, one very closely obtains the correct (observed) Earth magnetic elements, if one multiplies the yearly changes found between 1842 and 1885 with 15 and if this added to the elements of the epoch 1885.

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TABLE (12). Epoch 1915. Declination δ

φ \ λ = 0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+22.1	+11.2	-2.3	-14.2	-23.3	-31.9	-37.7	-39.6	-37.3	-28.8	-18.8	-7.3	+4.4	+15.4	+25.6	+34.0	+40.2	+43.5	+43.6	+40.7	+34.7	+27.4	+22.0
+70	+19.9	+7.8	-3.9	-14.1	-21.2	-25.5	-27.8	-27.3	-24.1	-17.9	-8.4	+2.3	+13.0	+23.4	+32.0	+38.1	+41.2	+40.2	+36.1	+29.1	+20.1	+11.1	+4.0
+60	+17.2	+5.0	-1.9	-9.7	-15.3	-16.8	-16.3	-13.5	-7.5	+1.8	+9.3	+17.9	+25.9	+32.7	+36.9	+38.7	+36.1	+32.1	+25.5	+17.4	+9.0	+2.6	-1.4
+50	+14.6	+2.3	-0.7	-6.0	-7.9	-8.1	-6.9	-3.4	+2.4	+8.4	+14.8	+21.6	+27.6	+31.9	+33.5	+32.7	+29.7	+24.7	+18.2	+11.0	+4.8	+0.7	-1.3
+40	+12.2	+0.3	-1.7	-4.9	-6.6	-6.6	-6.3	-4.7	+0.4	+4.7	+9.3	+13.5	+16.8	+18.7	+18.8	+17.1	+14.1	+10.1	+6.1	+2.8	+0.7	-0.1	-0.5
+30	+10.2	-1.2	-3.3	-6.4	-8.3	-9.0	-8.8	-7.8	-5.4	-2.2	+0.7	+3.2	+4.6	+5.1	+4.6	+3.5	+2.1	+0.6	-0.7	-1.5	-1.8	-1.7	-1.5
+20	+8.4	-2.5	-4.5	-7.1	-8.8	-9.6	-9.5	-8.8	-7.6	-6.1	-4.5	-3.0	-1.8	-0.9	-0.4	-0.4	-0.6	-0.9	-1.2	-1.4	-1.5	-1.5	-1.5
0	+6.9	-3.5	-5.5	-7.5	-9.0	-9.7	-9.7	-9.2	-8.3	-7.1	-5.9	-4.8	-3.8	-3.1	-2.7	-2.5	-2.5	-2.6	-2.7	-2.8	-2.8	-2.8	-2.8
-10	+5.6	-4.3	-6.3	-8.0	-9.3	-9.9	-9.8	-9.2	-8.3	-7.2	-6.1	-5.1	-4.3	-3.7	-3.3	-3.1	-3.1	-3.2	-3.3	-3.4	-3.5	-3.5	-3.5
-20	+4.5	-4.9	-6.7	-8.2	-9.3	-9.8	-9.6	-8.9	-7.9	-6.8	-5.8	-4.9	-4.2	-3.7	-3.4	-3.3	-3.3	-3.4	-3.5	-3.6	-3.7	-3.7	-3.7
-30	+3.7	-5.3	-6.8	-8.1	-9.0	-9.4	-9.1	-8.4	-7.5	-6.5	-5.6	-4.8	-4.2	-3.8	-3.5	-3.4	-3.4	-3.5	-3.6	-3.7	-3.8	-3.8	-3.8
-40	+3.1	-5.4	-6.7	-7.8	-8.5	-8.8	-8.4	-7.8	-7.0	-6.1	-5.3	-4.7	-4.2	-3.8	-3.6	-3.5	-3.5	-3.6	-3.7	-3.8	-3.8	-3.8	-3.8
-50	+2.8	-5.3	-6.4	-7.3	-7.8	-8.0	-7.7	-7.2	-6.6	-5.9	-5.3	-4.8	-4.3	-3.9	-3.7	-3.6	-3.6	-3.6	-3.7	-3.8	-3.8	-3.8	-3.8
-60	+2.6	-5.1	-6.0	-6.7	-7.1	-7.2	-6.9	-6.4	-5.9	-5.4	-4.9	-4.5	-4.1	-3.8	-3.6	-3.6	-3.6	-3.6	-3.7	-3.7	-3.8	-3.8	-3.8
-70	+2.5	-4.8	-5.5	-6.1	-6.4	-6.4	-6.1	-5.7	-5.3	-4.9	-4.5	-4.2	-3.9	-3.7	-3.6	-3.5	-3.5	-3.6	-3.6	-3.7	-3.7	-3.8	-3.8
-80	+2.5	-4.5	-5.1	-5.6	-5.8	-5.8	-5.6	-5.2	-4.9	-4.6	-4.3	-4.0	-3.8	-3.6	-3.5	-3.5	-3.5	-3.5	-3.6	-3.6	-3.7	-3.7	-3.8
-90	+2.5	-4.3	-4.8	-5.2	-5.4	-5.4	-5.2	-4.9	-4.7	-4.4	-4.2	-3.9	-3.8	-3.6	-3.5	-3.5	-3.5	-3.5	-3.6	-3.6	-3.7	-3.7	-3.8

TABLE (13). Epoch 1915. Inclination i.

φ \ λ = 0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+81.5	+81.3	+81.6	+82.0	+82.5	+83.1	+83.9	+84.7	+85.4	+86.0	+86.4	+86.6	+86.4	+86.0	+85.4	+84.7	+83.9	+83.1	+82.5	+82.0	+81.6	+81.3	+81.2
+70	+76.7	+76.5	+76.7	+77.1	+77.8	+78.5	+79.4	+80.4	+81.2	+81.9	+82.4	+82.7	+82.7	+82.4	+81.9	+81.2	+80.4	+79.4	+78.5	+77.8	+77.1	+76.7	+76.5
+60	+72.3	+72.1	+72.4	+72.9	+73.8	+74.8	+75.8	+76.8	+77.6	+78.3	+78.8	+79.0	+78.8	+78.3	+77.6	+76.8	+75.8	+74.8	+73.8	+72.9	+72.4	+72.1	+72.1
+50	+67.7	+67.6	+68.0	+68.8	+69.8	+70.9	+72.0	+73.1	+74.1	+74.9	+75.5	+75.9	+75.9	+75.5	+74.9	+74.1	+73.1	+72.0	+70.9	+69.8	+68.8	+68.0	+67.6
+40	+63.2	+63.2	+63.6	+64.4	+65.5	+66.8	+68.1	+69.4	+70.6	+71.6	+72.4	+72.9	+73.1	+72.9	+72.4	+71.6	+70.6	+69.4	+68.1	+66.8	+65.5	+64.4	+63.6
+30	+58.8	+58.9	+59.4	+60.3	+61.6	+63.1	+64.7	+66.3	+67.8	+69.1	+70.1	+70.8	+71.1	+70.8	+70.1	+69.1	+67.8	+66.3	+64.7	+63.1	+61.6	+60.3	+59.4
+20	+54.3	+54.6	+55.2	+56.2	+57.6	+59.3	+61.1	+62.9	+64.6	+66.1	+67.3	+68.2	+68.6	+68.2	+67.3	+66.1	+64.6	+62.9	+61.1	+59.3	+57.6	+56.2	+55.2
+10	+49.7	+50.1	+50.9	+52.0	+53.5	+55.4	+57.4	+59.4	+61.3	+63.0	+64.4	+65.4	+65.9	+65.4	+64.4	+63.0	+61.3	+59.4	+57.4	+55.4	+53.5	+52.0	+50.9
0	+45.1	+45.5	+46.3	+47.5	+49.2	+51.3	+53.5	+55.8	+58.0	+60.0	+61.7	+63.0	+63.7	+63.7	+63.0	+61.7	+60.0	+58.0	+55.8	+53.5	+51.3	+49.2	+47.5

TABLE (38) Epoch 1915. Inclination i.

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
-10°	-27,4	-39,8	-42,7	-42,3	-41,7	-39,7	-37,8	-37,7	-32,7	-31,4	-30,4	-27,6	-23,8	-21,4	-19,7	-17,6	-16,2	-13,8	-8,0	+0,4	+2,0	+5,9	+0,4	-18,7
-20	-44,9	-48,7	-53,4	-55,3	-54,6	-54,1	-53,3	-51,6	-50,8	-48,7	-47,0	-43,3	-41,0	-38,1	-34,8	-36,1	-33,4	-29,9	-23,3	-15,5	-7,6	-7,3	-12,4	-28,3
-30	-48,3	-56,4	-59,7	-62,2	-63,4	-63,4	-63,3	-63,2	-63,2	-61,9	-59,1	-56,4	-54,1	-50,8	-49,6	-48,6	-47,6	-42,6	-36,3	-27,8	-20,7	-17,5	-25,0	-36,6
-40	-53,5	-59,4	-64,0	-66,8	-68,7	-69,8	-70,3	-70,9	-71,3	-71,0	-69,0	-66,3	-63,6	-60,6	-59,0	-57,4	-55,7	-52,5	-46,6	-38,0	-31,7	-29,3	-35,9	-45,0
-50	-57,4	-62,8	-67,0	-69,7	-72,1	-73,4	-75,1	-76,8	-78,2	-78,1	-76,7	-73,7	-70,8	-68,2	-66,1	-64,7	-62,6	-59,2	-54,1	-46,8	-41,4	-39,7	-44,1	-50,6
-60	-61,3	-66,0	-69,1	-71,7	-73,8	-75,9	-78,2	-80,9	-82,8	-83,5	-82,2	-79,1	-77,5	-75,8	-74,1	-72,7	-70,7	-65,8	-61,4	-55,7	-51,1	-50,0	-52,5	-56,6
-70	-66,1	-68,9	-71,7	-73,9	-75,6	-77,8	-79,9	-83,0	-85,6	-87,2	-88,0	-86,2	-84,7	-82,7	-80,9	-78,5	-75,4	-72,0	-68,6	-65,5	-62,8	-60,9	-61,4	-63,4
-80	-72,0	-73,6	-74,9	-76,3	-77,6	-79,2	-81,6	-82,3	-83,5	-85,4	-85,9	-86,2	-85,8	-84,8	-83,1	-81,3	-79,4	-77,0	-75,1	-73,5	-71,7	-70,8	-71,0	-71,4

TABLE (39) Epoch 1915. Horizontal intensity J.

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	0,80	0,81	0,76	0,72	0,64	0,58	0,48	0,41	0,40	0,38	0,41	0,41	0,40	0,37	0,31	0,22	0,24	0,26	0,34	0,43	0,56	0,65	0,74	0,80
+70	1,17	1,16	1,15	1,08	1,00	0,92	0,78	0,72	0,74	0,87	1,01	1,07	1,11	1,05	0,91	0,72	0,49	0,17	0,14	0,50	0,72	0,84	1,04	0,98
+60	1,50	1,57	1,61	1,59	1,51	1,43	1,35	1,32	1,40	1,59	1,66	1,72	1,75	1,63	1,48	1,33	1,04	0,69	0,40	0,61	0,91	1,17	1,32	1,49
+50	1,92	2,00	2,05	2,11	2,13	2,10	2,04	2,12	2,17	2,26	2,29	2,32	2,21	2,13	2,03	1,86	1,65	1,37	1,11	1,14	1,37	1,50	1,66	1,76
+40	2,33	2,49	2,58	2,67	2,78	2,77	2,78	2,75	2,78	2,79	2,76	2,66	2,55	2,48	2,47	2,46	2,36	2,20	1,98	1,89	1,95	1,86	2,15	2,25
+30	2,74	2,96	3,04	3,21	3,34	3,43	3,45	3,40	3,32	3,19	3,06	2,94	2,83	2,80	2,82	2,91	2,90	2,87	2,77	2,56	2,43	2,33	2,38	2,56
+20	3,00	3,14	3,31	3,47	3,64	3,72	3,84	3,74	3,69	3,48	3,32	3,15	3,10	3,08	3,15	3,23	3,33	3,36	3,27	3,09	2,88	2,73	2,80	2,84
+10	3,20	3,27	3,32	3,44	3,57	3,85	3,90	3,98	3,86	3,73	3,58	3,44	3,40	3,38	3,41	3,44	3,58	3,62	3,54	3,26	2,98	2,90	2,96	3,07
0	2,92	3,03	3,09	3,18	3,36	3,56	3,76	3,88	3,92	3,86	3,77	3,66	3,59	3,54	3,50	3,48	3,52	3,54	3,45	3,21	2,92	2,87	2,68	2,91
-10	2,57	2,54	2,61	2,74	2,94	3,19	3,44	3,64	3,76	3,79	3,73	3,64	3,59	3,51	3,41	3,34	3,33	3,31	3,22	2,96	2,72	2,63	2,62	2,62
-20	2,24	2,20	2,22	2,31	2,52	2,65	2,85	3,10	3,31	3,44	3,46	3,42	3,37	3,30	3,21	3,11	3,08	3,05	2,95	2,71	2,53	2,41	2,38	2,34
-30	1,97	1,91	1,95	1,94	2,01	2,14	2,27	2,42	2,61	2,80	2,81	2,94	2,99	2,98	2,92	2,87	2,83	2,79	2,76	2,66	2,45	2,32	2,25	2,18
-40	1,98	1,93	1,75	1,69	1,66	1,70	1,76	1,82	1,90	1,99	2,19	2,34	2,47	2,60	2,62	2,63	2,63	2,70	2,77	2,76	2,55	2,43	2,27	2,13
-50	1,97	1,78	1,65	1,56	1,49	1,45	1,40	1,33	1,25	1,26	1,48	1,71	1,98	2,16	2,26	2,32	2,43	2,62	2,78	2,87	2,79	2,61	2,41	2,20
-60	2,06	1,84	1,67	1,48	1,37	1,27	1,15	0,95	0,77	0,71	0,85	1,13	1,38	1,60	1,81	1,97	2,20	2,44	2,68	2,83	2,82	2,67	2,50	2,29
-70	2,09	1,85	1,69	1,56	1,42	1,29	1,13	0,91	0,63	0,33	0,30	0,48	0,70	0,92	1,16	1,43	1,70	2,01	2,27	2,40	2,45	2,45	2,37	2,21
-80	1,77	1,69	1,58	1,48	1,36	1,22	1,08	0,91	0,74	0,57	0,45	0,37	0,43	0,61	0,85	1,06	1,30	1,50	1,66	1,82	1,89	1,90	1,90	1,85

e. Coefficients gh of the theory for epochs 1550, 1600, 1650, 1700, 1780, 1842, 1885 and 1900 Table (40)

Epoch	$g^{1,0}$	$g^{2,0}$	$g^{3,0}$	$g^{4,0}$	$g^{5,0}$	$g^{6,0}$	$g^{1,1}$	$g^{2,1}$	$g^{3,1}$	$g^{4,1}$	$g^{5,1}$	$g^{6,1}$	$h^{1,1}$	$h^{2,1}$	$h^{3,1}$	$h^{4,1}$	$h^{5,1}$	$h^{6,1}$
1550	+3,2278	+0,0258	-0,1838	-0,2645	-0,0263	-0,1107	+0,2629	-0,2875	+0,0792	-0,0866	-0,2842	-0,0999	-0,0977	-0,2875	+0,1536	-0,0654	-0,0206	+0,0114
1600	+3,2316	+0,0308	-0,1850	-0,2605	-0,0222	-0,0978	+0,2797	-0,3025	+0,0677	-0,1252	-0,2613	-0,0765	-0,1676	-0,2235	+0,1560	0,0000	+0,0775	+0,0019
1650	+3,2363	+0,0371	-0,1865	-0,2493	-0,0171	-0,0817	+0,3007	-0,3212	+0,0533	-0,1734	-0,2327	-0,0471	-0,2550	-0,2060	+0,1590	+0,0817	+0,0001	-0,0100
1700	+3,2365	+0,0441	-0,1967	-0,2369	-0,0936	-0,0834	+0,3141	-0,3501	+0,0715	-0,2117	-0,1777	-0,0059	-0,4089	-0,1301	+0,1480	+0,0430	+0,1830	-0,0045
1780	+3,1785	+0,0502	-0,2266	-0,2156	-0,1420	-0,1034	+0,3552	-0,4238	+0,1227	-0,5135	-0,2140	-0,1685	-0,5698	-0,0185	+0,1181	+0,0997	+0,2352	+0,0479
1842	+3,2271	-0,0028	-0,2148	-0,2344	+0,0183	-0,0313	+0,2751	-0,4746	+0,3362	-0,3426	-0,3623	-0,1153	-0,5931	+0,0245	+0,1263	-0,0541	+0,2312	-0,0389
1885	+3,1636	+0,0526	-0,2504	-0,4014	+0,1208	-0,1285	+0,2414	-0,4962	+0,3807	-0,3104	-0,3028	-0,1686	-0,5914	+0,1307	+0,1005	-0,1381	+0,3647	-0,1796
1900	+3,1412	+0,0721	-0,2693	-0,4388	+0,1567	-0,1625	+0,2296	-0,5038	+0,3963	-0,2991	-0,2820	-0,1873	-0,5907	+0,1673	+0,0915	-0,1675	+0,4114	-0,2258

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Table (40)

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a. Secular changes of the Earth's magnetic element between 1550-1900. The secular changes $\Delta P, \Delta F, \Delta X, \Delta Y, \Delta Z, \Delta\delta, \Delta i, \Delta T$ and ΔJ of the Earth's magnetic elements $P, F, X, Y, Z, \delta, i, T$ and J, when time is increased by one year was obtained using Publication II according to the theoretical tables $(27)_6$, $(28)_6$, $(29)_6$, $(30)_6$, $(31)_6$ $(32)_6$, $(33)_6$, $(34)_6$, $(35)_6$ pag. 59-97 and the tables (13)-(19) Chapter Ib and (27)-(33) Chapter Ic of this third publication. I have entered this into the following nine tables (41) to (49).

TABLE (41). Secular changes ΔT of the potential when the time is increased by one year in GE units of the 5th decimal, for 1600-1650. For $\varphi = +90°$ we have $\Delta T = +0,00008$ G.E. For $\varphi = -90°$ we have $\Delta T = +0,00026$ G.E.

TABLE (41). Yearly secular changes ΔT between 1600-1650. GE of the 5th decimal

φ	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+18	+16	+14	+12	+14	+22	+26	+30	+38	+40	+38	+36	+30	+24	+18	+12	+10	+10	+14	+18	+18	+24	+26	+20
+70	+10	-12	-28	-32	-26	-6	+18	+42	+58	+64	+56	+44	+26	+12	0	-8	-2	+6	+18	+30	+42	+48	+44	+28
+60	+4	-32	-72	-96	-110	-80	-30	+24	+58	+68	+60	+40	+12	-8	-24	-24	-10	+8	+30	+56	+78	+84	+68	+40
+50	+24	-40	-104	-162	-180	-152	-86	-8	+48	+58	+48	+24	+4	-8	-12	+6	+24	+48	+74	+104	+132	+146	+124	+80

φ	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	+46	-40	-134	-208	-240	-202	-128	-50	+8	+28	+22	+4	-22	-32	-18	+20	+56	+88	+104	+140	+176	+192	+178	+116
+80	+64	-30	-138	-234	-270	-240	-154	-72	-18	-6	-2	-14	-32	-46	-30	+22	+78	+116	+146	+172	+210	+226	+202	+146
+70	+80	-26	-140	-248	-280	-254	-146	-82	-48	-32	-12	-18	-52	-86	-60	+20	+104	+146	+158	+186	+224	+252	+228	+162
+60	+78	-30	-146	-242	-274	-218	-118	-66	-50	-62	-46	-34	-70	-110	-94	-10	+106	+158	+166	+188	+218	+258	+238	+166
0	+64	-52	-164	-262	-276	-196	-90	-44	-60	-82	-60	-40	-64	-108	-94	-2	+112	+156	+154	+164	+216	+246	+248	+168
-10	+54	-60	-170	-246	-252	-176	-78	-40	-56	-94	-78	-56	-62	-88	-70	+10	+100	+132	+126	+140	+200	+258	+246	+164
-20	+52	-58	-154	-234	-248	-186	-102	-70	-92	-126	-110	-74	-56	-50	-22	+46	+104	+110	+98	+122	+196	+258	+246	+158
-30	+36	-44	-140	-212	-234	-190	-130	-102	-114	-128	-120	-76	-40	-4	+28	+72	+90	+86	+74	+110	+186	+244	+240	+156
-40	+66	-28	-116	-180	-204	-182	-140	-114	-116	-128	-116	-76	-26	+20	+48	+64	+64	+54	+68	+114	+192	+244	+232	+164
-50	+68	-20	-98	-154	-182	-176	-150	-132	-118	-114	-98	-64	-24	+16	+38	+46	+42	+44	+58	+104	+162	+206	+206	+148
-60	+84	+16	-58	-112	-138	-136	-114	-88	-78	-72	-74	-60	-44	-20	+6	+32	+46	+52	+58	+84	+122	+152	+158	+136
-70	+54	+16	-16	-50	-72	-82	-82	-78	-72	-58	-44	-32	-18	-4	+4	+10	+20	+38	+54	+74	+92	+106	+104	+84
-80	+30	+16	-2	-20	-26	-36	-38	-40	-30	-24	-18	-12	-6	0	+2	+16	+18	+28	+38	+48	+54	+56	+50	+44

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TABLE (41). Secular changes ΔT of the potential between 1650-1700 when the time is increased by one year. GE of the 5th decimal

φ / λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	-6																							
+80	-10	-18	-22	-24	-24	-28	-28	-28	-32	-32	-30	-22	-14	-2	+14	+28	+40	+48	+52	+48	+40	+28	+14	+2
+70	-22	-42	-54	-58	-54	-50	-46	-46	-46	-50	-46	-38	-22	+2	+26	+58	+82	+98	+106	+102	+90	+66	+34	+6
+60	-36	-76	-100	-100	-78	-52	-38	-36	-42	-52	-56	-54	-40	-10	+28	+76	+118	+148	+162	+156	+130	+92	+48	+6
+50	-50	-124	-174	-174	-134	-70	-26	-14	-22	-34	-50	-68	-74	-52	+2	+66	+130	+182	+214	+212	+194	+142	+86	+20
+40	-54	-142	-244	-268	-204	-106	-20	+10	+4	-12	-36	-74	-102	-94	-36	+48	+132	+202	+256	+276	+260	+200	+124	+42
+30	-36	-190	-328	-372	-290	-144	-34	+12	+18	+12	-12	-78	-140	-150	-92	+16	+118	+212	+290	+336	+330	+264	+176	+82
+20	-24	-204	-378	-442	-358	-198	-62	+2	+18	+10	-22	-96	-172	-180	-106	+14	+122	+222	+322	+390	+394	+322	+218	+116
+10	+6	-174	-400	-492	-410	-248	-110	-48	-26	0	-20	-90	-170	-182	-92	+36	+142	+240	+346	+432	+446	+368	+264	+154
0	+12	-134	-390	-488	-428	-280	-154	-100	-76	-48	-54	-104	-164	-160	-70	+44	+144	+248	+362	+460	+472	+388	+274	+152
-10	+10	-132	-374	-476	-432	-312	-206	-156	-144	-112	-102	-106	-126	-98	-14	+84	+172	+264	+378	+468	+484	+400	+282	+154
-20	+8	-160	-328	-416	-398	-312	-238	-208	-190	-160	-124	-104	-92	-52	+24	+100	+174	+260	+370	+460	+470	+396	+276	+148
-30	+16	-132	-278	-358	-356	-304	-256	-240	-236	-214	-170	-116	-64	-16	+54	+114	+180	+260	+352	+428	+436	+378	+274	+152
-40	+30	-90	-206	-276	-290	-280	-260	-268	-254	-236	-178	-114	-42	+14	+66	+112	+166	+244	+320	+376	+386	+336	+246	+142
-50	+46	-52	-136	-204	-232	-236	-238	-236	-240	-216	-168	-112	-50	+4	+48	+96	+144	+204	+274	+316	+328	+292	+224	+144
-60	+44	-24	-78	-116	-148	-176	-206	-228	-228	-200	-142	-84	-34	+20	+46	+68	+100	+156	+218	+264	+276	+248	+190	+120
-70	+62	+16	-28	-66	-94	-116	-134	-140	-138	-126	-104	-76	-42	-8	+28	+66	+102	+132	+162	+180	+186	+174	+144	+108
-80	+50	+26	+6	-14	-34	-48	-56	-56	-58	-54	-42	-26	-10	+10	+30	+46	+70	+84	+96	+100	+102	+98	+86	+70
-90	+24																							

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TABLE (41). Yearly secular changes ΔT between 1700-1780. GE of the 5th decimal. For $\varphi=+90°$ we have $\Delta\bar{T}=-0,00066$ for $\varphi=-90°$ we have $\Delta\bar{T}=+0,00036$

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-110	-112	-111	-104	-91	-75	-57	-42	-31	-23	-21	-25	-27	-30	-34	-36	-39	-42	-50	-60	-69	-81	-94	-102
+70	-137	-152	-155	-140	-111	-72	-32	0	+14	+17	+7	-7	-22	-32	-27	-25	-16	-12	-12	-30	-36	-57	-85	-112
+60	-138	-176	-152	-175	-129	-67	-9	+30	+47	+36	+6	-29	-54	-64	-47	-19	+11	+32	+45	+50	+41	+14	-29	-86
+50	-126	-185	-213	-195	-142	-70	0	+45	+55	+29	-23	-80	-111	-115	-81	-29	+27	+70	+97	+110	+115	+86	+34	-45
+40	-94	-174	-222	-212	-157	-76	-2	+44	+50	+10	-57	-124	-166	-158	-107	-35	+37	+99	+148	+179	+183	+162	+97	+6
+30	-74	-171	-229	-229	-174	-87	-9	+32	+26	-17	-92	-158	-200	-191	-125	-35	+54	+120	+179	+224	+243	+[illegible]	+148	+41
+20	-55	-166	-243	-256	-200	-110	-23	+17	+11	-31	-104	-171	-201	-183	-116	-31	+56	+135	+205	+262	+288	+256	+180	+64
+10	-39	-164	-260	-280	-222	-120	-36	+7	+5	-35	-100	-164	-188	-155	-85	-7	+67	+144	+228	+292	+314	+277	+199	+85
0	-16	-158	-268	-298	-241	-148	-64	-17	-6	-35	-81	-133	-143	-106	-39	+22	+79	+152	+243	+317	+338	+300	+218	+114
-10	+6	-137	-255	-291	-250	-171	-101	-59	-32	-39	-70	-107	-104	-62	0	+44	+85	+151	+243	+328	+356	+320	+244	+137
-20	+27	-117	-232	-270	-251	-195	-146	-106	-76	-64	-72	-87	-70	-27	+20	+51	+84	+146	+243	+320	+368	+336	+260	+157
-30	+42	-87	-183	-226	-223	-200	-179	-151	-114	-87	-74	-70	-52	-17	+11	+37	+71	+141	+243	+336	+376	+352	+276	+169
-40	+79	-36	-122	-173	-174	-178	-197	-183	-155	-122	-105	-91	-74	-47	-15	+15	+62	+136	+237	+330	+377	+364	+302	+198
-50	+129	+34	-44	-95	-129	-160	-176	-182	-163	-142	-121	-104	-81	-56	-21	+15	+69	+148	+238	+325	+368	+362	+311	+226
-60	+163	+91	+30	-26	-69	-106	-129	-141	-138	-131	-120	-104	-81	-54	-22	+21	+81	+154	+230	+293	+330	+330	+298	+236
-70	+185	+136	+86	+44	+2	-34	-60	-79	-87	-89	-84	-69	-50	-26	+6	+47	+95	+149	+199	+243	+269	+274	+261	+228
-80	+155	+132	+107	+82	+56	+35	+15	0	-9	-10	-7	0	+12	+30	+50	+72	+101	+127	+152	+173	+186	+187	+185	+173

TABLE (41). Yearly secular changes ΔT between 1780-1842. GE of the 5th decimal. For $\varphi=+90°$ we have $\Delta\bar{T}=+0,00010$, for $\varphi=-90°$, $\Delta\bar{T}=-0,00144$

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+27	+19	+5	-2	-8	-11	-16	-18	-18	-21	-24	-26	-24	-23	-18	-8	+2	+15	+24	+34	+43	+43	+43	+36
+70	+10	-8	-19	-26	-26	-27	-26	-27	-26	-23	-29	-34	-39	-40	-42	-29	-10	+18	+42	+63	+71	+65	+52	+31
+60	-18	-36	-47	-47	-36	-21	-5	+5	+6	+6	-3	-16	-31	-45	-55	-55	-36	+5	+40	+69	+77	+68	+42	+13
+50	-71	-90	-82	-56	-16	+21	+50	+63	+65	+53	+43	+32	+10	-13	-40	-47	-29	+5	+50	+79	+84	+63	+15	-32
+40	-144	-166	-127	-65	+6	+68	+108	+132	+126	+113	+92	+82	+69	+50	+15	-3	+3	+36	+69	+87	+77	+45	-11	-82
+30	-236	-255	-191	-82	+26	+106	+158	+183	+183	+156	+137	+123	+134	+126	+95	+36	+45	+68	+87	+87	+68	+24	-53	-155
+20	-323	-353	-263	-108	+34	+129	+177	+203	+204	+185	+169	+166	+180	+185	+163	+124	+105	+103	+106	+94	+63	+18	-76	-204
+10	-398	-427	-318	-134	+15	+108	+156	+182	+191	+167	+156	+163	+188	+195	+166	+132	+118	+118	+118	+108	+89	+32	-89	-253
0	-425	-459	-345	-156	-13	+73	+113	+140	+152	+147	+139	+134	+145	+150	+132	+115	+133	+134	+135	+131	+113	+56	-71	-263
-10	-389	-425	-325	-163	-32	+42	+63	+81	+87	+85	+79	+81	+82	+84	+69	+79	+100	+132	+153	+158	+142	+89	-43	-228
-20	-296	-339	-264	-126	-26	+21	+29	+34	+39	+39	+32	+29	+19	+13	+6	+26	+71	+131	+171	+195	+187	+139	+19	-148
-30	-180	-219	-182	-103	-42	-10	-2	0	-3	-10	-18	-23	-32	-39	-40	-13	+39	+100	+130	+180	+187	+152	+60	-68
-40	-95	-124	-111	-74	-40	-23	-21	-19	-31	-36	-40	-47	-56	-66	-66	-39	+5	+58	+108	+139	+150	+123	+56	-21
-50	-65	-85	-89	-76	-60	-50	-45	-47	-53	-60	-66	-66	-74	-82	-89	-73	-40	-2	+29	+47	+63	+53	+24	-24
-60	-79	-89	-97	-87	-77	-68	-66	-65	-68	-74	-84	-92	-98	-102	-103	-97	-90	-77	-66	-55	-42	-39	-45	-60
-70	-126	-131	-127	-123	-121	-[illegible]	-106	-103	-102	-100	-102	-111	-116	-121	-131	-139	-137	-135	-129	-123	-118	-116	-118	-121
-80	-156	-153	-150	-148	-145	-142	-139	-139	-139	-142	-144	-147	-150	-156	-156	-158	-161	-161	-161	-158	-161	-158	-156	-156

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TABLE (41) Yearly secular changes ΔT between 1842-1885. GE of the 5th decimal. For $\varphi=+90$, $\Delta T=-0{,}00142$; for $\varphi=-90$, $\Delta T=+0{,}00170$.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-139	-137	-126	-119	-112	-110	-107	-110	-112	-119	-126	-133	-139	-142	-149	-151	-154	-151	-154	-151	-154	-151	-149	-147
+70	-126	-107	-90	-72	-58	-47	-49	-52	-63	-81	-95	-114	-131	-139	-151	-151	-156	-154	-151	-159	-151	-151	-147	-139
+60	-135	-108	-63	-28	-7	+14	+21	+19	+7	-23	-54	-83	-112	-126	-137	-135	-128	-131	-128	-135	-151	-163	-174	-163
+50	-141	-112	-56	0	+35	+54	+70	+67	+54	+23	-19	-52	-81	-97	-102	-112	-110	-95	-97	-110	-147	-182	-196	-196
+40	-128	-156	-70	+7	+63	+95	+116	+114	+95	+54	+9	-30	-61	-77	-79	-81	-77	-77	-79	-105	-151	-212	-260	-266
+30	-162	-191	-93	+5	+72	+116	+133	+139	+128	+102	+52	-5	-54	-70	-70	-56	-40	-32	-40	-75	-172	-219	-278	-292
+20	-209	-230	-114	-9	+63	+100	+112	+128	+123	+107	+58	-2	-58	-90	-90	-65	-35	-12	-14	-49	-123	-209	-290	-327
+10	-225	-246	-149	-37	+35	+67	+81	+95	+100	+107	+65	+5	-61	-97	-93	-61	-25	+16	+16	-12	-81	-186	-278	-330
0	-207	-248	-191	-58	+14	+32	+25	+23	+42	+58	+44	-7	-61	-90	-90	-58	-23	+19	+44	+28	-32	-128	-230	-295
-10	-273	-237	-163	-70	-19	-12	-16	-16	0	+23	+28		-37	-65	-65	-47	0	+54	+95	+105	+65	-28	-149	-237
-20	-217	-198	-144	-91	-58	-49	-47	-40	-25	-5	+9	+2	-2	-12	0	+28	+72	+128	+182	+203	+179	+79	-52	-166
-30	-142	-161	-116	-67	-25	-16	-21	-25	-16	+7	+32	+44	+49	+58	+79	+110	+156	+212	+230	+323	+304	+212	+70	-63
-40	-58	-93	-79	-32	+12	+49	+61	+63	+63	+65	+70	+79	+95	+116	+139	+172	+217	+290	+357	+406	+388	+307	+177	+37
-50	+40	+2	+9	+44	+83	+133	+154	+166	+151	+142	+135	+133	+128	+137	+154	+188	+239	+304	+376	+430	+420	+360	+241	+128
-60	+126	+90	+93	+114	+144	+177	+198	+205	+196	+184	+172	+161	+149	+147	+159	+179	+228	+283	+346	+385	+380	+341	+264	+188
-70	+168	+159	+149	+156	+184	+201	+217	+219	+212	+193	+172	+159	+144	+139	+154	+179	+203	+237	+262	+273	+276	+262	+232	+196
-80	+186	+182	+173	+184	+184	+191	+191	+191	+188	+184	+174	+163	+159	+159	+156	+161	+170	+186	+191	+196	+203	+198	+198	+186

TABLE (42). Secular changes ΔF of the ideal magnetism Fz between 1600-1650 when the time is increased by one year. GE of the 5th decimal. For $\varphi=+90°$, $\Delta F_z=-0{,}00012$; for $\varphi=-90°$, $\Delta F_z=-0{,}00006$.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-6	-6	-8	-14	-18	-22	-30	-34	-34	-32	-30	-22	-14	-4	+2	+6	+10	+8	+4	+4	0	0	-2	-4
+70	+2	+6	+10	+6	-2	-16	-32	-50	-58	-56	-44	-28	-10	+6	+20	+26	+26	+24	+20	+8	-2	-6	-6	-2
+60	+4	+20	+36	+42	+36	+14	-18	-48	-64	-66	-50	-28	-4	+14	+24	+30	+30	+26	+14	+2	-16	-28	-20	-12
+50	-2	+22	+50	+70	+74	+52	+10	-30	-54	-60	-44	-20	0	+14	+16	+14	+16	+12	+4	-16	-34	-42	-40	-22
+40	-20	+10	+48	+86	+102	+84	+40	-4	-30	-38	-30	-14	+6	+16	+10	0	-10	-8	-14	-30	-54	-66	-58	-42
+30	-30	0	+46	+96	+118	+96	+48	+8	-6	-10	-12	-8	+10	+24	+14	-8	-30	-34	-28	-40	-64	-80	-72	-54
+20	-36	-6	+44	+96	+118	+86	+30	+4	+6	+6	-4	-6	+16	+46	+44	+4	-38	-50	-38	-40	-66	-86	-82	-58
+10	-28	0	+44	+84	+104	+58	+2	-16	+4	+16	-2	-10	+20	+68	+72	+20	-42	-58	-40	-32	-58	-84	-80	-56
0	-18	+10	+50	+92	+94	+38	-22	-36	-2	+22	+6	-8	+22	+72	+82	+26	-40	-56	-30	-18	-46	-78	-80	-48
-10	-6	+20	+56	+88	+86	+32	-24	-38	0	+32	+22	+2	+16	+54	+58	+6	-46	-46	-14	-2	-38	-78	-78	-44
-20	-2	+26	+54	+82	+82	+38	-14	-26	+10	+42	+40	+12	+6	+16	+12	-18	-44	-26	+6	+8	-36	-82	-82	-42
-30	-10	+24	+52	+76	+82	+52	+12	0	+22	+50	+48	+22	-2	-16	-26	-36	-34	-4	+20	+6	-44	-90	-92	-54
-40	-20	+18	+48	+72	+80	+62	+34	+22	+32	+48	+46	+22	-6	-26	-38	-36	-14	+14	+24	-2	-54	-98	-102	-66
-50	-32	+6	+36	+58	+66	+58	+40	+28	+32	+36	+34	+20	-4	-22	-26	-16	+2	+20	+18	-12	-60	-92	-96	-72
-60	-32	-4	+22	+38	+46	+42	+36	+28	+26	+22	+20	+10	-2	-8	-8	+2	+14	+18	+10	-18	-50	-76	-76	-60
-70	-28	-14	+2	+14	+22	+22	+18	+14	+12	+10	+8	+6	+4	+4	+4	+8	+10	+10	-2	-18	-32	-46	-48	-42
-80	-18	-10	-6	-2	+2	+2	+4	+2	+2	+2	+2	0	+2	+2	+2	+2	0	-2	-8	-12	-18	-24	-24	-22

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TABLE (42). Yearly secular changes ΔF between 1650-1700. GE of the 5th decimal.
For $\varphi = +90°$, $\Delta F = +0.00006$; for $\varphi = -90°$, $\Delta F = -0.00016$.

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+4	+4	+4	+3	+3	+3	+12	+14	+14	+16	+16	+16	+10	+6	0	-1	-1	-3	-6	-8	-6	-4	0	+2
+70	+8	+10	+8	+8	+6	+4	+4	+12	+18	+24	+28	+24	+16	+4	-8	-20	-26	-28	-30	-24	-16	-8	0	+4
+60	+13	+24	+26	+22	+6	-8	-12	-6	+8	+22	+28	+28	+22	+8	-10	-30	-42	-52	-48	-42	-24	-6	+2	+10
+50	+22	+40	+46	+52	+22	-16	-36	-32	-12	+6	+20	+28	+30	+20	0	-28	-48	-60	-64	-58	-40	-20	0	+8
+40	+22	+60	+98	+100	+54	-12	-52	-56	-38	-20	0	+24	+46	+48	+28	-10	-38	-60	-74	-78	-62	-34	-12	+2
+30	+6	+64	+128	+146	+88	0	-58	-64	-52	-40	-22	+20	+66	+84	+58	+14	-24	-50	-78	-98	-90	-60	-34	-19
+20	-14	+58	+146	+180	+120	+18	-44	-56	-50	-50	-38	+14	+80	+106	+36	+26	-14	-40	-80	-116	-118	-84	-54	-40
+10	-28	+50	+154	+198	+144	+42	-26	-38	-34	-42	-34	+16	+84	+106	+72	+18	-14	-38	-82	-130	-140	-106	-68	-52
0	-24	+46	+146	+198	+150	+58	-2	-10	-6	-20	-24	+16	+68	+84	+46	0	-26	-42	-88	-140	-154	-116	-72	-56
-10	-22	+42	+132	+180	+144	+66	+16	+16	+24	+14	0	+16	+44	+46	+14	-18	-32	-48	-92	-144	-154	-116	-68	-46
-20	-10	+44	+116	+154	+128	+70	+36	+40	+52	+48	+26	+20	+20	+12	-10	-36	-36	-54	-94	-140	-148	-112	-66	-40
-30	-4	+42	+94	+122	+104	+68	+48	+60	+76	+74	+34	+24	+4	-10	-22	-28	-30	-50	-92	-130	-138	-108	-66	-34
-40	-8	+28	+66	+86	+80	+62	+58	+72	+92	+86	+64	+32	+2	-16	-20	-20	-24	-44	-80	-112	-120	-100	-68	-38
-50	-20	+8	+36	+52	+58	+58	+64	+78	+88	+86	+66	+34	+6	-10	-14	-16	-20	-38	-68	-92	-100	-92	-72	-46
-60	-34	-12	+8	+26	+38	+46	+54	+64	+70	+68	+54	+34	+14	0	-6	-14	-24	-38	-58	-74	-82	-78	-66	-52
-70	-36	-20	-8	+6	+16	+28	+36	+42	+46	+44	+36	+22	+12	0	-8	-14	-24	-36	-46	-56	-62	-60	-56	-48
-80	-28	-24	-16	-8	-2	+6	+10	+14	+16	+14	+10	+8	0	-4	-12	-18	-24	-28	-34	-38	-40	-40	-38	-34

TABLE (42). Yearly secular changes ΔF between 1700-1780. GE of the 5th decimal.
For $\varphi = +90°$, $\Delta F = +0.00026$; for $\varphi = -90°$, $\Delta F = -0.00039$.

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+62	+60	+56	+47	+35	+22	+9	-1	-7	-11	-11	-9	-4	0	+6	+10	+16	+21	+29	+35	+42	+49	+55	+60
+70	+80	+85	+80	+64	+39	+11	-14	-35	-45	-47	-39	-26	-14	-5	0	+2	+4	+6	+12	+20	+29	+41	+54	+70
+60	+74	+90	+89	+71	+41	+1	-34	-53	-69	-60	-40	-14	+5	+14	+11	+4	-6	-9	-10	-9	-4	+4	+25	+51
+50	+55	+81	+89	+75	+42	0	-39	-64	-67	-50	-19	+16	+41	+48	+34	+12	-9	-22	-30	-35	-41	-35	-15	+19
+40	+35	+69	+84	+74	+42	0	-36	-55	-51	-27	+3	+23	+36	+37	+24	+19	-11	-23	-41	-56	-69	-67	-45	-7
+30	+25	+61	+82	+76	+47	+4	-31	-47	-37	-10	+29	+30	+25	+32	+14	+13	-7	-30	-49	-67	-84	-80	-56	-19
+20	+20	+60	+87	+86	+52	+5	-31	-44	-32	-4	+34	+31	+25	+29	+7	+10	-9	-31	-54	-77	-89	-82	-58	-21
+10	+12	+59	+95	+99	+61	+9	-31	-42	-34	-11	+23	+60	+77	+66	+36	+7	-10	-30	-57	-85	-92	-77	-52	-23
0	+1	+56	+104	+109	+72	+17	-27	-36	-35	-19	+12	+44	+55	+36	+7	-9	-11	-26	-60	-91	-97	-80	-56	-30
-10	-1	+57	+105	+115	+81	+34	+1	-16	-23	-20	+1	+26	+30	+7	-15	-17	-9	-19	-57	-95	-105	-87	-64	-40
-20	-4	+52	+97	+107	+82	+51	+31	+17	+1	-10	-1	+11	+11	-9	-23	-15	0	-9	-51	-97	-114	-100	-75	-45
-30	-4	+44	+81	+89	+79	+66	+59	+49	+30	+11	+16	+9	+5	-9	-15	-1	+11	-2	-48	-99	-122	-114	-85	-49
-40	-12	+27	+54	+62	+62	+67	+72	+71	+55	+36	+23	+20	+15	+9	+3	+15	+20	-4	-52	-1	-133	-127	-97	-57
-50	-35	-5	+16	+29	+33	+52	+66	+72	+67	+55	+45	+39	+36	+34	+34	+32	+20	-12	-61	-111	-138	-137	-111	-75
-60	-67	-42	-21	-6	+10	+29	+47	+59	+62	+61	+56	+54	+51	+49	+41	+30	+6	-27	-70	-109	-133	-137	-124	-96
-70	-86	-67	-50	-34	-16	+1	+19	+32	+41	+45	+47	+48	+44	+36	+27	+10	-12	-41	-71	-99	-116	-122	-117	-104
-80	-77	-67	-57	-47	-34	-22	-12	-2	+4	+10	+12	+12	+10	+2	-5	-17	-30	-47	-60	-74	-82	-87	-87	-84

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TABLE (42). Yearly secular changes ΔF between 1780-1842. GE of the 5th decimal.
For $\varphi=+90^\circ$, $\Delta F=-0.00018$; for $\varphi=-90^\circ$, $\Delta F=+0.00327$

φ \ λ=	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-27	-18	-11	-3	+5	+10	+13	+16	+19	+19	+21	+19	+19	+12	+11	+6	-2	-13	-23	-31	-36	-37	-37	-32
+70	-27	-15	0	+13	+23	+27	+29	+31	+32	+36	+37	+40	+45	+47	+45	+36	+21	+2	-21	-40	-52	-56	-50	-42
+60	-15	0	+13	+21	+24	+27	+27	+27	+27	+29	+34	+40	+50	+61	+69	+66	+48	+18	-16	-42	-55	-55	-47	-32
+50	+6	+19	+21	+16	+8	+3	-1	-5	-5	+3	+11	+21	+32	+47	+65	+69	+56	+24	-15	-40	-48	-45	-31	-11
+40	+37	+45	+32	+6	-19	-36	-45	-48	-43	-29	-16	-10	-8	+5	+27	+45	+40	+15	-18	-36	-35	-31	-13	-13
+30	+76	+87	+55	+2	-47	-66	-77	-82	-74	-58	-40	-40	-42	-47	-26	0	+6	-5	-21	-29	-27	-21	0	+33
+20	+127	+140	+90	+11	-50	-76	-84	-89	-85	-69	-52	-55	-76	-85	-68	-39	-23	-23	-26	-23	-21	-15	+11	+66
+10	+174	+191	+127	+29	-40	-65	-68	-74	-77	-65	-48	-53	-74	-87	-76	-50	-37	-14	-29	-21	-19	-18	+16	+95
0	+195	+215	+145	+43	-26	-43	-42	-45	-52	-43	-34	-37	-53	-60	-50	-36	-31	-17	-34	-31	-34	-34	+11	+103
-10	+175	+195	+132	+39	-18	-24	-16	-18	-24	-23	-15	-13	-18	-16	-10	-8	-23	-42	-50	-55	-65	-60	-11	+85
-20	+119	+137	+92	+26	-15	-16	-3	0	0	+2	+6	+10	+13	+21	+26	+16	-11	-45	-68	-81	-94	-27	-42	+42
-30	+47	+66	+39	+3	-18	-15	0	+10	+15	+16	+21	+24	+32	+42	+45	+29	-5	-43	-73	-94	-105	-102	-68	-8
-40	-5	+10	+2	-11	-15	-10	+2	+10	+15	+19	+23	+26	+34	+43	+45	+36	+6	-26	-53	-71	-84	-85	-71	-37
-50	-18	-6	-5	-6	-5	0	+6	+11	+13	+16	+16	+21	+27	+36	+39	+36	+24	+6	-10	-24	-36	-42	-42	-29
-60	+10	+11	+13	+15	+15	+15	+16	+15	+15	+15	+15	+18	+24	+32	+40	+47	+48	+43	+39	+31	+23	+18	+10	+6
-70	+48	+45	+43	+42	+40	+37	+36	+32	+29	+27	+29	+31	+37	+45	+53	+63	+69	+76	+76	+74	+71	+65	+60	+53
-80	+77	+74	+69	+66	+63	+58	+56	+53	+53	+52	+53	+55	+58	+65	+69	+76	+81	+85	+87	+89	+89	+87	+85	+81

TABLE (42). Yearly secular changes ΔF between 1842-1885. GE of the 5th decimal.
For $\varphi=+90^\circ$, $\Delta F=+0.00067$, ; for $\varphi=-90^\circ$, $\Delta F=+0.00052$

φ \ λ=	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+42	+40	+40	+40	+37	+40	+42	+44	+47	+52	+52	+56	+56	+56	+58	+54	+52	+54	+49	+49	+44	+42	+42	+40
+70	+25	+21	+16	+14	+14	+14	+16	+21	+25	+32	+40	+47	+49	+54	+52	+52	+49	+40	+37	+32	+32	+32	+30	+28
+60	+21	+9	-9	-12	-16	-16	-16	-14	-7	+5	+21	+30	+40	+44	+44	+40	+37	+30	+28	+25	+28	+32	+35	+32
+50	+30	+7	-16	-32	-42	-44	-44	-42	-32	-19	+2	+19	+25	+28	+28	+25	+21	+19	+16	+21	+30	+47	+54	+49
+40	+56	+21	-14	-40	-54	-58	-61	-61	-54	-35	-12	+9	+21	+21	+14	+12	+7	+2	+2	+14	+37	+63	+77	+77
+30	+88	+49	+7	-30	-49	-63	-65	-63	-61	-44	-21	+5	+19	+19	+14	+5	-2	-12	-12	+5	+37	+75	+100	+107
+20	+113	+75	+25	-21	-49	-56	-58	-58	-61	-56	-32	0	+25	+35	+25	+9	-5	-19	-16	-2	+32	+77	+112	+126
+10	+121	+86	+37	-9	-37	-40	-39	-35	-44	-49	-37	-2	+35	+52	+49	+30	+12	-5	-14	-5	+23	+65	+105	+126
0	+119	+88	+49	-2	-27	-14	+2	+5	-9	-28	-25	-2	+40	+63	+65	+49	+25	+7	-7	-9	+12	+49	+90	+119
-10	+110	+86	+47	+12	0	+14	+37	+47	+32	+9	-2	+9	+32	+49	+54	+44	+30	+9	-14	-30	-13	+14	+63	+102
-20	+95	+83	+52	+23	+19	+35	+54	+65	+54	+35	+16	+12	+14	+16	+19	+16	+7	-16	-49	-75	-72	-37	+23	+75
-30	+75	+75	+56	+32	+21	+28	+40	+44	+42	+30	+14	-2	-12	-19	-21	-23	-32	-63	-102	-131	-139	-100	-32	+35
-40	+40	+56	+47	+23	0	-14	-16	-13	-7	-5	-7	-16	-28	-40	-47	-54	-70	-102	-131	-153	-138	-159	-83	-12
-50	+5	+23	+16	-7	-40	-63	-77	-77	-65	-32	-37	-30	-30	-35	-40	-49	-75	-116	-163	-201	-207	-177	-112	-47
-60	-25	-9	-16	-37	-67	-93	-112	-112	-100	-77	-54	-30	-16	-9	-9	-23	-47	-83	-123	-156	-163	-146	-10.	-58
-70	-32	-30	-37	-52	-72	-88	-100	-100	-86	-65	-40	-19	-2	+12	+14	+7	-9	-32	-56	-75	-86	-81	-67	-49
-80	-23	-28	-30	-37	-44	-47	-49	-47	-40	-30	-19	-7	+5	+12	+16	+16	+9	+2	-7	-16	-23	-25	-25	-25

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TABLE (43). Secular changes ΔX between 1550-1600 when time is increased by one year.
GE units of the 5th decimal

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	+30	-6	-42	-76	-102	-124	-138	-140	-132	-118	-94	-66	-30	+6	+42	+76	+102	+124	+138	+140	+132	+118	+94	+66
+80	+6	+36	+62	+74	+62	+2	-40	-106	-146	-158	-138	-92	-30	+36	+102	+150	+174	+170	+144	+102	+54	+14	-70	-12
+70	-50	+36	+130	+204	+226	+196	+104	-2	-86	-132	-130	-82	-26	+36	+82	+112	+130	+126	+92	+34	-38	-96	-122	-104
+60	-120	-12	+126	+264	+346	+344	+262	+144	+42	-24	-54	-48	-28	0	+6	+16	+30	+36	+22	-36	-114	-184	-210	-188
+50	-186	-82	+72	+244	+398	+386	+334	+254	+166	+96	+32	-14	-26	-34	-44	-64	-66	-46	-42	-82	-154	-228	-252	-238
+40	-208	-124	+24	+188	+302	+324	+300	+266	+238	+176	+84	+8	-12	0	-16	-64	-102	-98	-80	-94	-150	-220	-252	-252
+30	-164	-96	+14	+132	+208	+202	+180	+194	+224	+196	+102	+8	+4	+48	+58	-12	-104	-122	-92	-82	-120	-180	-206	-200
+20	-84	-30	+38	+100	+112	+72	+48	+92	+172	+176	+106	+18	+16	+78	+90	+16	-88	-112	-68	-36	-68	-124	-154	-130
+10	+14	+52	+74	+78	+48	-2	-24	+22	+116	+162	+132	+44	+10	+24	+30	-18	-80	-82	-40	-2	-28	-72	-74	-40
0	+66	+90	+72	+40	+16	+6	+12	+50	+108	+152	+148	+78	-6	-78	-108	-112	-92	-50	-8	+2	-24	-48	-40	+14
-10	+76	+88	+52	+8	-6	+36	+82	+112	+122	+152	+168	+116	-1	-166	-232	-192	-86	-12	+2	-24	-46	-48	-14	+28
-20	+56	+64	+22	-22	-20	+50	+126	+146	+132	+134	+158	+136	-8	-180	-254	-182	-52	+10	-14	-62	-76	-42	-6	+28
-30	+36	+30	-8	-66	-74	-4	+88	+120	+90	+66	+84	+102	+28	-86	-136	-78	+10	+12	-48	-96	-74	-10	+28	+34
-40	+50	+8	-56	-130	-158	-104	-24	+16	-18	-30	-4	+48	+62	+36	+24	+46	+46	-4	-80	-92	-22	+74	+108	+72
-50	+94	-6	-114	-208	-254	-230	-174	-130	-126	-120	-74	+6	+82	+126	+138	+120	+62	-18	-74	-38	+70	+184	+218	+178
-60	+132	-20	-146	-252	-332	-318	-290	-254	-208	-180	-102	+4	+80	+156	+154	+104	+44	-34	-26	+62	+176	+288	+302	+228
-70	+158	+4	-138	-258	-334	-362	-346	-310	-254	-190	-106	-28	+42	+88	+94	+74	+42	+24	+50	+130	+252	+324	+342	+280
-80	+144	+20	-100	-204	-278	-328	-332	-314	-270	-212	-140	-72	-28	+20	+44	+60	+78	+106	+152	+210	+262	+300	+292	+240
-90	+96	+26	-46	-118	-178	-226	-258	-276	-282	-250	-212	-158	-96	-26	+46	+118	+178	+226	+258	+276	+272	+250	+212	+158

TABLE (43). Secular changes ΔX between 1600-1650 when time is increased by one year.
GE units of the 5th decimal

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	+38	+34	+10	-6	-22	-34	-46	-54	-60	-58	-56	-38	-18	-24	-10	+6	+22	+34	+46	+54	+60	+58	+56	+48
+80	+52	+114	+160	+172	+150	+90	+14	-58	-110	-128	-102	-54	+8	+62	+52	+104	+94	+62	+22	-26	-54	-68	-58	-10
+70	+124	+190	+254	+324	+336	+276	+158	+32	-60	-92	-66	-20	+40	+76	+90	+76	+40	-4	-62	-128	-180	-196	-152	-84
+60	-46	+92	+252	+360	+434	+398	+278	+146	+46	+8	+20	+44	+62	+48	+20	-32	-70	-106	-150	-206	-244	-276	-240	-160
+50	-122	+6	+170	+332	+422	+406	+316	+222	+162	+128	+110	+106	+94	+66	-6	-36	-162	-190	-208	-230	-278	-292	-274	-210
+40	-134	-50	+80	+222	+302	+234	+228	+204	+214	+206	+160	+118	+114	+118	+60	-62	-178	-216	-200	-200	-234	-262	-244	-196
+30	-100	-44	+34	+124	+138	+90	+48	+86	+146	+196	+142	+96	+116	+172	+150	+12	-130	-186	-152	-118	-142	-180	-182	-124
+20	-20	+10	+34	+46	+10	-72	-116	-44	+74	+140	+110	+70	+108	+190	+202	+0	-62	-120	-78	-28	-38	-82	-70	-54
+10	+58	+66	+52	+4	-62	-142	-180	-114	+18	+108	+104	+54	+54	+106	+120	+64	-14	-34	+28	+70	+58	-8	-28	-34
0	+78	+74	+24	-36	-86	-118	-118	-70	+26	+100	+120	+66	-10	-62	-80	-54	-10	+58	+114	+122	+78	+24	+8	+42
-10	+50	+40	-14	-74	-80	-30	+24	+54	+80	+110	+130	+76	-66	-208	-258	-134	0	+126	+160	+130	+64	+14	-8	+20
-20	-12	-26	-60	-100	-66	+38	+138	+58	+118	+96	+100	+42	-100	-270	-304	-156	+54	+178	+158	+82	+30	+8	0	-10
-30	-56	-74	-102	-128	-88	+32	+156	+180	+112	+48	+40	+14	-72	-178	-184	-48	+116	+172	+108	+24	+12	+24	+12	-26
-40	-54	-96	-152	-188	-164	-56	+64	+84	+20	-56	-68	-40	-44	-56	-12	+84	+152	+128	+44	+12	+56	+104	+88	+8
-50	-18	-114	-196	-248	-234	-158	-64	-34	-70	-132	-140	-86	-10	+52	+112	+140	+118	+54	+12	+42	+138	+216	+208	+110
-60	+58	-68	-200	-288	-294	-270	-198	-146	-154	-152	-148	-100	-2	+64	+120	+116	+54	+18	+14	+86	+218	+292	+292	+208
-70	+116	-34	-170	-272	-318	-300	-262	-216	-188	-164	-138	-82	-28	+22	+42	+40	+16	+16	+62	+156	+260	+332	+330	+246
-80	+140	+30	-76	-162	-224	-248	-254	-236	-212	-178	-144	-110	-80	-50	-16	-2	+24	+68	+134	+200	+260	+294	+288	+214
-90	+116	+62	+2	-56	-114	-162	-200	-222	-232	-224	-202	-166	-118	-62	-2	+56	+114	+162	+200	+222	+232	+224	+202	+166

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TABLE (43). Secular changes ΔX between 1650-1700 when time is increased by one year.
GE units of the 5th decimal

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	-16	+44	+100	+150	+190	+216	+228	+226	+206	+172	+130	+76	+16	-44	-100	-150	-190	-216	-228	-226	-206	-172	-130	-76
+80	+50	+104	+138	+186	+140	+130	+124	+126	+132	+138	+130	+104	+58	-8	-90	-174	-244	-290	-304	-286	-244	-182	-106	-24
+70	+100	+186	+230	+216	+154	+76	+14	0	+18	+56	+90	+110	+92	+42	-42	-140	-238	-312	-342	-324	-270	-188	-102	-2
+60	+114	+254	+348	+350	+238	+70	-60	-114	-98	-50	+12	+86	+142	+146	+72	-42	-162	-262	-324	-342	-298	-226	-128	-14
+50	+56	+260	+438	+478	+344	+114	-74	-158	-164	-130	-62	+60	+180	+232	+186	+78	-56	-182	-298	-374	-368	-306	-202	-96
+40	-48	+196	+442	+548	+430	+202	+4	-98	-138	-132	-106	+36	+200	+288	+254	+144	+26	-102	-244	-362	-406	-356	-278	-172
+30	-120	+76	+354	+498	+450	+280	+120	+36	-22	-78	-78	+32	+184	+260	+214	+126	+38	-52	-184	-328	-402	-370	-298	-248
+20	-140	+2	+210	+358	+370	+234	+222	+182	+122	+42	-2	+26	+88	+106	+58	+2	-14	-50	-146	-274	-342	-314	-256	-206
+10	-100	-40	+50	+132	+224	+240	+286	+296	+268	+196	+102	+24	-36	-96	-136	-120	-84	-68	-118	-200	-248	-228	-170	-128
0	-24	-50	-70	-42	+50	+176	+278	+336	+342	+318	+202	+26	-156	-262	-258	-190	-114	-80	-82	-96	-106	-102	-66	-34
-10	+28	-64	-174	-202	-96	+76	+232	+318	+364	+354	+246	+28	-204	-320	-278	-174	-84	-54	-24	+2	+24	+22	+30	+44
-20	+12	-108	-274	-340	-236	-16	+156	+250	+296	+304	+218	+36	-176	-264	-210	-100	-24	+14	+64	+122	+140	+100	+58	+40
-30	-40	-178	-352	-418	-306	-96	+78	+156	+182	+190	+148	+30	-104	-162	-100	-14	+46	+92	+162	+232	+238	+162	+80	+28
-40	-96	-248	-396	-422	-358	-178	-30	+32	+36	+40	+32	+4	-24	-28	+4	+40	+80	+136	+238	+316	+316	+230	+104	+8
-50	-112	-256	-386	-434	-382	-272	-180	-148	-154	-124	-98	-44	-4	+24	+46	+62	+106	+184	+288	+364	+366	+278	+150	+20
-60	-64	-208	-326	-388	-386	-348	-318	-316	-314	-284	-214	-128	-44	+12	+50	+80	+126	+208	+310	+392	+406	+352	+242	+100
-70	+30	-112	-232	-316	-384	-392	-412	-428	-428	-392	-312	-220	-110	-28	+40	+88	+156	+244	+340	+408	+428	+388	+276	+176
-80	+126	-6	-138	-252	-350	-426	-470	-490	-474	-436	-366	-274	-170	-62	+26	+136	+234	+318	+390	+446	+462	+432	+354	+254
-90	+180	+58	-63	-190	-298	-386	-448	-480	-476	-444	-380	-290	-180	-58	+68	+190	+298	+386	+448	+480	+478	+444	+390	+290

TABLE (43). Secular changes ΔX between 1700-1780 when time is increased by one year.
GE units of the 5th decimal

φ \ λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	+265	+258	+235	+194	+142	+79	+11	-59	-124	-180	-233	-254	-264	-258	-235	-194	-142	-79	-11	+59	+124	+180	+225	+254
+80	+224	+273	+269	+216	+121	+4	-111	-200	-254	-258	-232	-189	-142	-125	-115	-129	-151	-166	-171	-151	-106	-34	+57	+148
+70	+84	+188	+229	+194	+100	-31	-148	-226	-239	-187	-94	+9	+74	+81	+34	-48	-137	-216	-285	-324	-323	-275	-179	-49
+60	-73	+64	+150	+151	+92	-74	-97	-138	-112	-23	+95	+211	+273	+251	+160	+26	-110	-226	-327	-406	-457	-446	-364	-231
+50	-141	-11	+84	+119	+92	+36	-12	-19	+25	+111	+213	+306	+346	+311	+200	+56	-77	-191	-287	-376	-448	-461	-404	-286
+40	-142	-34	+61	+107	+100	+61	+36	+49	+90	+152	+213	+266	+280	+238	+143	+37	-60	-196	-233	-313	-364	-367	-324	-241
+30	-109	-19	+75	+125	+111	+66	+47	+56	+81	+107	+125	+136	+119	+71	+15	-32	-66	-114	-186	-249	-277	-250	-210	-168
+20	-97	-15	+76	+133	+122	+86	+61	+54	+52	+36	+11	-10	-52	-102	-124	-109	-80	-89	-141	-186	-194	-161	-135	-127
+10	-112	-37	+57	+120	+122	+116	+109	+91	+42	-17	-70	-115	-180	-227	-225	-157	-75	-56	-101	-147	-144	-120	-117	-132
0	-125	-74	-7	+49	+101	+154	+194	+176	+106	+1	-87	-163	-237	-276	-248	-146	-47	-14	-49	-101	-124	-124	-132	-141
-10	-120	-112	-102	-57	+35	+160	+255	+267	+194	+80	-45	-150	-223	-232	-177	-80	+5	+35	+2	-52	-105	-137	-144	-135
-20	-112	-158	-203	-181	-54	+115	+250	+300	+263	+161	+34	-86	-137	-114	-39	+26	+51	+42	+20	-22	-76	-113	-126	-106
-30	-157	-246	-321	-302	-174	+5	+191	+234	+249	+197	+101	+3	-80	+23	+79	+90	+56	+22	+16	+10	-23	-75	-104	-120
-40	-232	-344	-411	-392	-283	-144	-22	+70	+136	+137	+131	+89	+80	+109	+124	+89	+21	-15	+5	+35	+31	-12	-69	-138
-50	-261	-383	-446	-437	-362	-280	-200	-120	-30	+31	+74	+71	+71	+79	+61	+12	-40	-40	+26	+110	+139	+100	+1	-126
-60	-188	-317	-393	-411	-400	-373	-341	-287	-223	-151	-104	-75	-66	-67	-84	-101	-87	-17	+101	+217	+275	+238	+126	-30
-70	+22	-117	-226	-307	-350	-400	-421	-419	-398	-362	-326	-298	-275	-252	-221	-164	-75	+55	+208	+345	+426	+410	+318	+177
-80	+279	+135	-9	-174	-260	-367	-437	-492	-523	-530	-519	-487	-441	-373	-276	-150	0	+167	+325	+455	+532	+547	+504	+405
-90	+449	+329	+187	+34	-124	-273	-401	-504	-572	-601	-588	-537	-449	-329	-187	-34	+124	+273	+401	+504	+572	+601	+588	+537

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TABLE (43). Secular changes ΔX between 1780-1842 when time is increased by one year. GE units of the 5th decimal

φ	λ = 0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	-144	-103	-56	-6	+45	+94	+135	+167	+188	+196	+191	+172	+144	+103	+56	+6	-45	-94	-135	-167	-188	-196	-191	-172
+80	-27	+31	+79	+110	+121	+119	+113	+103	+102	+106	+121	+144	+166	+179	+169	+135	+76	0	-77	-139	-175	-177	-174	-82
+70	+116	+153	+158	+135	+84	+27	-21	-53	-68	-65	-42	+ 5	+61	+121	+167	+174	+139	+68	-27	-92	-116	-90	-24	+50
+60	+258	+266	+198	+ 90	-31	-126	-204	-248	-256	-248	-211	-182	-139	-73	+ 5	+61	+63	+16	-31	-55	- 31	+ 29	+105	+195
+50	+365	+352	+223	+ 36	-145	-279	-353	-389	-381	-347	-314	-316	-326	-306	-237	-155	-100	-82	-73	-43	+19	+ 94	+188	+293
+40	+375	+372	+309	+60	-163	-293	-353	-374	-368	-334	-309	-344	-408	-453	-419	-341	-255	-180	-102	-26	+45	+111	+212	+357
+30	+532	+550	+392	+137	-68	-161	-195	-212	-219	-207	-198	-247	-333	-405	-411	-366	-287	-206	-102	-16	+39	+ 82	+185	+360
+20	+500	+537	+408	+203	+63	+21	+26	+11	-18	- 39	-53	- 76	-129	-185	-210	-225	-204	-160	-94	-47	-21	+ 3	+115	+311
+10	+308	+347	+272	+172	+134	+156	+201	+211	+188	+147	+112	+105	+111	+102	+66	+ 5	-60	-89	-92	-58	-121	-105	- 5	+166
0	-23	+ 6	+27	+ 71	+137	+207	+266	+304	+298	+264	+237	+255	+306	+333	+304	+196	+73	-31	-110	-172	-211	-203	-144	- 77
-10	-389	-373	-258	-85	+ 76	+179	+250	+301	+325	+311	+293	+318	+382	+421	+390	+282	+140	+11	-102	-182	-223	-236	-264	-328
-20	-623	-624	-446	-182	+ 21	+132	+190	+245	+282	+283	+276	+298	+342	+366	+331	+250	+160	+81	-6	-71	-121	-169	-279	-465
-30	-608	-631	-454	-193	+ 3	+ 95	+132	+163	+187	+203	+199	+211	+223	+223	+206	+190	+187	+195	+167	+140	+94	+ 24	-145	-398
-40	-360	-406	-287	- 94	+53	+118	+124	+124	+124	+126	+123	+116	+111	+106	+113	+153	+230	+318	+364	+389	+366	+277	+90	-158
-50	-40	-100	-53	+50	+131	+150	+144	+131	+111	+102	+ 89	+ 84	+ 79	+ 74	+ 98	+166	+269	+395	+489	+540	+540	+469	+325	+129
-60	+203	+139	+129	+148	+177	+185	+179	+163	+148	+139	+132	+126	+116	+113	+129	+190	+280	+382	+469	+527	+548	+516	+429	+312
-70	+252	+211	+183	+185	+188	+196	+198	+193	+198	+195	+190	+182	+164	+153	+152	+169	+211	+264	+314	+358	+382	+379	+352	+298
-80	+127	+126	+123	+131	+145	+161	+177	+190	+196	+198	+190	+177	+160	+135	+116	+95	+ 87	+ 87	+97	+110	+126	+137	+139	+135
-90	-50	-27	-5	+18	+ 42	+ 61	+ 76	+ 85	+90	+ 89	+ 81	+ 68	+ 50	+ 27	+ 5	-18	-42	-61	-76	- 85	- 90	- 89	- 81	- 68

TABLE (43). Secular changes ΔX between 1842-1885 when time is increased by one year. GE units of the 5th d-cimal

φ'	λ = 0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	-219	-273	-311	-323	-316	-287	-239	-174	- 95	-14	+70	+151	+219	+273	+311	+323	+316	+287	+239	+174	+ 95	+ 14	- 70	-151
+80	- 49	- 97	-147	-201	-234	-262	-266	-257	-226	-191	-137	- 93	- 55	- 19	+ 2	+ 9	+ 7	- 2	+ 2	+ 2	+ 16	+ 19	+ 12	- 14
+70	0	-83	-170	-244	-300	-336	-340	-360	-327	-271	-207	-149	-102	- 75	- 67	- 67	- 77	- 81	- 77	- 43	- 8	+ 44	+ 72	+ 56
+60	+112	0	-121	-224	-300	-355	-383	-378	-350	-287	-232	-172	-131	-112	-116	-131	-142	-137	-119	- 67	+ 12	+ 102	+177	+182
+50	+237	+133	+ 2	-119	-207	-260	-290	-297	-285	-257	-203	-151	-116	-119	-143	-161	-174	-172	-156	- 88	+ 16	+ 156	+248	+280
+40	+302	+224	+105	- 9	- 88	-133	-161	-174	-184	-186	-156	-107	- 65	- 52	- 81	-126	-170	-193	-188	-128	- 25	+ 116	+234	+307
+30	+264	+241	+151	+ 63	+ 9	- 2	0	- 16	- 70	-123	-133	- 83	- 14	+ 23	+ 2	- 54	-126	-166	-186	-166	- 93	+ 12	+128	+228
+20	+154	+179	+151	+100	+ 83	+107	+147	+144	+ 79	- 7	- 61	- 44	+ 23	+ 72	+ 81	+ 40	- 28	- 97	-156	-182	-172	-114	- 21	+ 81
+10	0	+ 47	+100	+119	+159	+224	+276	+278	+219	+113	+ 35	- 7	+ 5	+ 40	+ 58	+ 44	0	- 70	-154	-228	-273	-262	-203	-100
0	-142	- 58	+ 23	+102	+184	+271	+323	+339	+313	+228	+112	- 2	- 77	- 93	- 82	- 75	- 81	-135	-228	-330	-406	- 473	-353	-248
-10	-265	-142	- 25	+ 88	+166	+212	+236	+239	+248	+209	+110	- 35	-186	-276	-294	-278	-262	-300	-388	-500	- 588	- 595	-523	-402
-20	-380	-224	- 90	0	+ 35	+ 16	- 16	- 21	+ 7	+ 28	- 12	-131	-278	-390	-434	-427	-425	-472	-551	-649	- 708	- 715	-658	-530
-30	-483	-319	-209	-144	-163	-241	-325	-343	-292	-224	-182	-214	-287	-357	-404	-432	-460	-520	-567	-633	- 669	- 697	-683	-604
-40	-549	-460	-371	-323	-346	-427	-504	-525	-476	-397	-311	-250	-219	-214	-228	-257	-300	-320	-327	-334	- 323	- 453	-540	-572
-50	-509	-516	-479	-430	-423	-430	-458	-472	-441	-378	-292	-191	-114	- 56	- 47	- 44	- 28	+ 12	+ 67	+ 105	+ 65	- 67	-250	-418
-60	-362	-439	-432	-364	-299	-237	-203	-186	-177	-166	-139	- 95	- 37	+ 16	+ 52	+ 95	+ 163	+ 278	+ 397	+ 467	+ 432	+ 285	+ 56	-179
-70	-163	-253	-255	-184	- 81	+ 14	+ 81	+ 112	+ 90	+ 58	+ 9	- 21	- 32	- 21	+ 19	+ 95	+ 207	+ 353	+ 486	+ 572	+ 556	+ 439	+ 232	+ 19
-80	+ 16	- 37	- 30	+ 5	+ 70	+ 144	+ 188	+ 203	+ 172	+ 116	+ 40	- 32	- 77	- 93	- 72	- 9	+ 79	+ 191	+ 290	+ 360	+ 357	+ 307	+ 217	+ 107
-90	+295	+318	+320	+300	+257	+203	+128	+ 49	- 35	- 116	- 151	- 250	- 295	- 318	- 320	- 300	- 257	- 203	- 128	- 49	+ 35	+ 116	+ 191	+ 250

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TABLE (44). Secular changes $\Delta\gamma$ between 1550-1600 when time is increased by one year.
Gauss units of the 5th decimal

φ	$\lambda=0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	-138	-140	-132	-118	-94	-66	-30	+6	+42	+76	+102	+124	+138	+140	+132	+118	+94	+66	+30	-6	-42	-76	-102	-124
+80	-24	-20	-38	-72	-106	-132	-134	-104	-52	+36	+114	+184	+220	+224	+190	+136	+66	-8	-62	-100	-110	-100	-74	-44
+70	+90	+118	+86	+10	-96	-130	-230	-202	-116	+2	+118	+206	+246	+242	+202	+134	+48	-42	-122	-174	-172	-130	-54	+26
+60	+174	+232	+218	+116	-54	-208	-298	-298	-192	-44	+94	+188	+226	+212	+174	+124	+52	-44	-150	-220	-216	-148	-38	+80
+50	+226	+320	+338	+214	+24	-200	-334	-332	-216	-98	+34	+140	+178	+172	+130	+98	+52	-28	-144	-240	-248	-162	-30	+104
+40	+250	+378	+390	+338	+86	-134	-332	-332	-246	-142	-28	+62	+146	+134	+80	+46	+42	-8	-120	-244	-274	-186	-36	+110
+30	+258	+412	+436	+398	+124	-166	-308	-294	-232	-182	-98	+32	+146	+132	+46	-14	+8	+14	-88	-242	-300	-210	-42	+112
+20	+272	+430	+532	+418	+114	-180	-284	-248	-190	-210	-168	-6	+168	+166	+24	-82	-46	+16	-52	-224	-318	-230	-44	+122
+10	+296	+444	+536	+412	+84	-212	-270	-168	-136	-216	-228	-44	+172	+184	-4	-144	-90	+36	-6	-208	-332	-244	-32	+156
0	+322	+430	+524	+394	+58	-226	-254	-122	-78	-198	-254	-90	+146	+178	-12	-166	-90	+54	+18	-202	-354	-242	-20	+182
-10	+354	+448	+502	+374	+64	-206	-238	-102	-56	-186	-278	-156	+62	+116	-30	-130	-90	+98	+30	-222	-384	-266	+14	+232
-20	+388	+454	+490	+376	+94	-174	-216	-102	-54	-172	-290	-226	-56	+22	-30	-68	+38	+122	+12	-254	-398	-264	+38	+270
-30	+426	+484	+496	+382	+124	-114	-186	-114	-84	-186	-308	-292	-168	-56	-28	+18	+112	+134	-34	-298	-416	-254	+56	+304
-40	+468	+516	+500	+382	+168	-54	-156	-142	-128	-194	-300	-324	-248	-132	-28	+74	+136	+94	-104	-330	-400	-228	+84	+340
-50	+482	+532	+504	+382	+198	+2	-116	-146	-166	-222	-300	-332	-268	-156	-24	+78	+106	+22	-160	-334	-354	-184	+100	+348
-60	+472	+516	+486	+372	+212	+44	-76	-146	-188	-232	-278	-284	-244	-152	-46	+24	+28	-62	-192	-290	-276	-124	+110	+328
-70	+416	+466	+446	+356	+230	+92	-28	-112	-182	-224	-250	-234	-216	-158	-98	-68	-82	-188	-188	-220	-174	-48	+126	+298
-80	+338	+380	+370	+316	+232	+138	+34	-58	-132	-188	-218	-228	-214	-192	-178	-164	-160	-166	-158	-130	-60	+36	+146	+256
-90	+258	+276	+272	+250	+212	+158	+96	+26	-46	-118	-178	-226	-258	-276	-272	-250	-212	-158	-96	-26	+46	+118	+178	+226

TABLE (44). Secular changes $\Delta\gamma$ between 1600-1650 when time is increased by one year.
Gauss units of the 5th decimal

φ	$\lambda=0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	-44	-54	-60	-58	-56	-48	-38	-24	-10	+6	+22	+34	+46	+54	+60	+58	+56	+48	+38	+24	+10	-6	-22	-34
+80	+92	+68	+20	-48	-112	-162	-168	-134	-68	+12	+92	+164	+156	+136	+92	+40	-16	-58	-80	-78	-52	-4	+44	+84
+70	+224	+202	+122	+2	-132	-244	-292	-258	-136	+6	+124	+182	+188	+146	+78	+6	-68	-112	-144	-128	-80	+10	+110	+190
+60	+324	+328	+258	+102	-108	-294	-372	-322	-172	-6	+126	+184	+168	+100	+26	-42	-96	-150	-192	-186	-112	+18	+158	+248
+50	+374	+406	+372	+212	-50	-308	-416	-364	-206	-24	+108	+162	+134	+38	-56	-112	-114	-136	-180	-200	-134	+12	+176	+298
+40	+388	+450	+440	+288	-8	-296	-412	-336	-180	-36	+60	+118	+104	-6	-132	-188	-156	-116	-152	-196	-152	+8	+192	+318
+30	+390	+470	+494	+326	-14	-314	-392	-274	-130	-58	+2	+90	+118	+74	-186	-278	-214	-114	-108	-170	-154	+2	+186	+314
+20	+390	+472	+496	+318	-46	-338	-358	-182	-50	-50	-40	+76	+162	+44	-228	-378	-286	-98	-58	-150	-178	-26	+188	+320
+10	+394	+454	+472	+280	-96	-376	-338	-96	+36	-32	-76	+50	+198	+94	-232	-436	-328	-84	-14	-140	-204	-52	+138	+338
0	+400	+428	+430	+232	-132	-400	-320	-36	+112	+4	-94	+8	+176	+92	-234	-444	-328	-56	+24	-132	-230	-72	+202	+368
-10	+422	+416	+392	+202	-148	-398	-302	+6	+160	+42	-108	-48	+98	+44	-224	-390	-252	+2	+38	-162	-280	-110	+204	+396
-20	+446	+412	+368	+194	-118	-334	-266	+10	+158	+50	-116	-132	-30	-44	-204	-278	-142	+38	+2	-218	-322	-118	+216	+428
-30	+482	+438	+370	+208	-58	-270	-232	-78	+122	+40	-130	-202	-158	-138	-170	-152	-30	+58	-52	-282	-354	-136	+218	+446
-40	+508	+468	+382	+220	-10	-198	-192	-50	+58	-4	-142	-244	-232	-184	-126	-40	+50	+42	-124	-338	-362	-136	+206	+448
-50	+518	+434	+400	+244	+50	-98	-136	-74	-22	-56	-152	-226	-234	-174	-92	0	+42	-30	-204	-366	-358	-132	+180	+426
-60	+480	+382	+440	+278	+110	-28	-92	-90	-82	-106	-162	-208	-204	-148	-74	-18	-22	-106	-240	-[illegible]	-286	-98	+154	+372
-70	+396	+422	+378	+276	+158	+40	-32	-76	-90	-108	-134	-150	-152	-130	-94	-84	-110	-172	-256	-256	-198	-60	+126	+290
-80	+292	+324	+312	+268	+196	+110	+56	-26	-74	-100	-120	-128	-140	-148	-152	-164	-180	-190	-188	-158	-96	-4	+112	+216
-90	+200	+228	+232	+224	+202	+166	+118	+62	+2	-56	-114	-162	-200	-222	-232	-224	-202	-166	-118	-62	-2	+56	+114	+162

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TABLE (44) Secular changes ΔY between 1650-1700 when time is increased by one year.
Gauss units of the 5th decimal

φ	$\lambda=0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	+228	+226	+206	+172	+130	+76	+16	-44	-100	-150	-190	-216	-228	-226	-206	-172	-130	-76	-16	+44	+100	+150	+190	+216
+80	+234	+190	+138	+90	+52	+30	+12	-10	-36	-74	-126	-186	-234	-266	-270	-246	-184	-98	-4	+86	+168	+222	+258	+254
+70	+262	+192	+102	+4	-60	-70	-32	+14	+36	+76	-48	-124	-214	-284	-332	-304	-232	-134	-8	+110	+216	+276	+306	+296
+60	+334	+266	+118	-66	-192	-210	-116	+2	+76	+82	+34	-46	-158	-274	-350	-358	-296	-174	-28	+118	+236	+310	+342	+342
+50	+428	+390	+186	-112	-342	-366	-210	-26	+90	+120	+114	+62	-60	-214	-366	-408	-358	-246	-94	+86	+242	+336	+370	+398
+40	+518	+534	+318	-114	-470	-518	-308	-70	+58	+114	+174	+186	+66	-166	-374	-446	-402	-328	-188	+14	+230	+358	+382	+422
+30	+598	+676	+436	-86	-542	-616	-366	-100	+22	+90	+216	+300	+170	-136	-400	-488	-438	-380	-290	-80	+190	+366	+404	+448
+20	+636	+782	+552	-36	-576	-672	-400	-124	-24	+44	+216	+330	+224	-130	-424	-492	-432	-412	-364	-152	+176	+388	+416	+454
+10	+658	+860	+636	+28	-544	-660	-394	-136	-56	+12	+172	+340	+210	-148	-436	-476	-416	-424	-418	-272	+158	+404	+436	+456
0	+654	+892	+666	+88	-468	-594	-350	-118	-92	-76	+82	+238	+134	-186	-418	-428	-364	-406	-438	-242	+140	+416	+454	+446
-10	+638	+804	+695	+126	-384	-502	-284	-86	-84	-114	-20	+180	+22	-212	-376	-374	-340	-410	-448	-242	+194	+434	+480	+434
-20	+628	+740	+586	+140	-282	-388	-210	-52	-70	-152	-144	-80	-112	-234	-328	-308	-310	-388	-418	-226	+150	+432	+506	+512
-30	+618	+666	+524	+168	-164	-252	-134	-20	-56	-168	-228	-216	-226	-254	-268	-264	-308	-440	-402	-200	+136	+408	+508	+542
-40	+600	+590	+478	+218	-34	-110	-40	+18	-46	-140	-302	-330	-312	-274	-242	-254	-322	-402	-380	-186	+106	+366	+490	+546
-50	+572	+556	+450	+268	+100	+24	+30	+20	-64	-212	-342	-398	-364	-302	-236	-276	-332	-376	-354	-156	+88	+316	+462	+536
-60	+554	+532	+452	+324	+212	+136	+88	+28	-76	-212	-332	-392	-386	-342	-306	-316	-348	-360	-304	-156	+44	+252	+412	+512
-70	+520	+520	+472	+400	+304	+222	+130	+34	-88	-210	-328	-396	-476	-406	-388	-378	-360	-344	-258	-130	+40	+216	+360	+468
-80	+484	+504	+486	+432	+352	+262	+150	+34	-88	-204	-302	-380	-428	-444	-438	-412	-368	-306	-214	-94	+18	+132	+318	+424
-90	+448	+480	+478	+444	+380	+290	+180	+58	-68	-190	-298	-386	-448	-480	-478	-444	-388	-290	-180	-58	+68	+170	+298	+386

TABLE (44) Secular changes ΔY between 1700-1780 when time is increased by one year.
Gauss units of the 5th decimal

φ	$\lambda=0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	+11	-59	-124	-180	-225	-254	-264	-258	-235	-194	-142	-74	-11	+59	+124	+180	+225	+254	+264	+259	+235	+194	+142	+79
+80	+126	+7	-127	-250	-338	-375	-354	-282	-184	-82	+2	+55	+76	+72	+65	+62	+76	+105	+151	+201	+246	+270	+260	+214
+70	+254	+107	-85	-268	-399	-439	-387	-262	-104	+47	+142	+164	+116	+35	-37	-79	-74	-32	+32	+115	+208	+286	+332	+332
+60	+361	+194	-29	-252	-414	-460	-387	-217	-20	+157	+256	+244	+133	-22	-156	-217	-204	-148	-72	+20	+139	+277	+388	+417
+50	+455	+275	+37	-210	-391	-442	-354	-158	+56	+235	+319	+277	+120	-87	-255	-317	-291	-225	-156	-67	+71	+268	+402	+480
+40	+530	+324	+84	-169	-356	-407	-307	-112	+104	+269	+341	+283	+92	-143	-326	-390	-336	-267	-210	-127	+19	+225	+413	+511
+30	+494	+374	+138	-135	-348	-392	-281	-82	+122	+273	+331	+241	+65	-176	-351	-392	-344	-285	-243	-155	+10	+217	+401	+501
+20	+504	+414	+186	-111	-336	-385	-260	-65	+119	+249	+294	+225	+26	-199	-343	-363	-331	-305	-275	-170	+19	+231	+388	+485
+10	+512	+448	+230	-96	-342	-389	-260	-75	+90	+213	+267	+182	-16	-214	-307	-299	-285	-310	-308	-217	+42	+241	+369	+457
0	+538	+511	+282	-65	-336	-367	-251	-102	+31	+152	+214	+143	-49	-221	-264	-230	-236	-317	-338	-197	+91	+242	+357	+451
-10	+562	+542	+311	-31	-271	-317	-233	-130	-31	+81	+146	+75	-95	-223	-211	-149	-193	-325	-374	-230	+31	+238	+358	+464
-20	+586	+551	+324	+23	-185	-226	-188	-151	-97	-1	+71	+23	-116	-203	-163	-109	-180	-351	-426	-281	-7	+231	+379	+499
-30	+594	+536	+329	+85	-71	-111	-116	-141	-146	-90	-23	-36	-125	-174	-133	-102	-205	-391	-479	-341	-49	+232	+418	+538
-40	+593	+529	+338	+161	+55	+16	-30	-104	-152	-139	-96	-89	-131	-151	-138	-136	-290	-456	-523	-381	-87	+218	+441	+568
-50	+591	+521	+381	+256	+176	+125	+59	-32	-111	-131	-119	-116	-161	-163	-186	-254	-391	-527	-563	-419	-129	+183	+429	+563
-60	+563	+530	+444	+364	+296	+238	+162	+64	-31	-92	-120	-139	-174	-219	-287	-335	-504	-569	-577	-424	-156	+137	+377	+520
-70	+532	+548	+520	+468	+408	+341	+256	+161	+59	-26	-100	-164	-232	-312	-405	-501	-583	-611	-561	-411	-188	+64	+289	+450
-80	+475	+546	+568	+560	+514	+444	+360	+255	+142	+25	-94	-205	-317	-421	-516	-587	-617	-594	-517	-330	-194	+2	+195	+356
-90	+401	+504	+571	+601	+588	+537	+449	+329	+187	+34	-124	-273	-401	-504	-571	-601	-588	-537	-449	-329	-187	-34	+124	+273

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TABLE (44) Secular changes ΔY between 1780-1842 when time is increased by one year.
Gauss units of the 5th decimal

φ	$\lambda=0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	+135	+167	+188	+196	+192	+172	+144	+103	+56	+6	-45	-94	-135	-167	-188	-196	-191	-172	-144	-103	-56	-6	+45	+94
+80	+204	+206	+183	+148	+111	+77	+53	+39	+31	+26	+16	-3	-37	-84	-142	-196	-237	-245	-220	-161	-73	+23	+110	+171
+70	+225	+180	+124	+66	+8	-33	-31	-16	+11	+37	+63	+74	+65	+19	-63	-163	-256	-306	-279	-183	-47	+85	+188	+228
+60	+219	+126	+18	-65	-102	-108	-89	-53	+5	+55	+89	+110	+119	+100	+27	-100	-233	-308	-276	-156	-5	+135	+227	+261
+50	+206	+40	-121	-223	-227	-193	-138	-63	+18	+76	+94	+98	+119	+140	+106	-11	-169	-258	-225	-100	+56	+188	+284	+295
+40	+215	-32	-269	-377	-345	-265	-148	-44	+32	+90	+85	+58	+74	+135	+153	+55	-100	-187	-148	-89	+110	+231	+334	+342
+30	+264	-98	-421	-530	-425	-274	-153	-55	+48	+108	+66	-5	0	+95	+172	+115	-23	-103	-66	+32	+135	+266	+408	+446
+20	+331	-139	-542	-642	-479	-271	-156	-71	+34	+103	+58	-42	-50	+61	+158	+132	+24	-32	+5	+65	+137	+277	+481	+558
+10	+379	-164	-624	-700	-482	-235	-131	-77	+5	+77	+34	-53	-69	+36	+127	+103	+18	-10	+27	+71	+124	+300	+567	+671
0	+433	-167	-643	-710	-459	-206	-106	-71	-5	+61	+31	-45	-53	+29	+82	+42	-37	-42	+3	+42	+115	+329	+634	+745
-10	+440	-137	-586	-631	-390	-150	-69	-63	-19	+37	+31	-8	-8	+27	+24	-56	-126	-115	-53	+5	+103	+341	+633	+750
-20	+414	-87	-462	-508	-304	-103	-34	-29	-11	+24	+31	+16	+27	+39	-25	-131	-217	-203	-124	-39	+89	+331	+608	+691
-30	+358	-18	-308	-352	-214	-68	-8	-3	+11	+32	+34	+34	+48	+31	-50	-187	-272	-255	-172	-68	+69	+280	+511	+567
-40	+287	+39	-150	-199	-129	-47	0	+15	+23	+37	+47	+55	+61	+24	-66	-187	-268	-263	-199	-105	+26	+203	+376	+422
-50	+207	+68	-45	-94	-74	-34	-6	+8	+19	+26	+39	+48	+60	+36	-37	-132	-199	-217	-177	-103	-10	+116	+228	+274
-60	+116	+52	-10	-47	-50	-40	-27	-11	-2	+18	+36	+55	+68	+52	+6	-53	-102	-127	-118	-85	-27	+43	+110	+145
-70	+32	+13	-18	-40	-50	-56	-50	-40	-15	+11	+40	+68	+84	+81	+63	+27	-8	-43	-60	-60	-37	-5	+24	+39
-80	-34	-43	-51	-69	-69	-69	-63	-43	-21	+8	+40	+69	+92	+98	+98	+82	+56	+27	+5	-11	-24	-24	-27	-27
-90	-76	-85	-90	-89	-81	-68	-50	-27	-5	+18	+42	+61	+76	+85	+90	+89	+81	+68	+50	+27	+5	-18	-42	-61

TABLE (44) Secular changes ΔY between 1842-1885 when time is increased by one year.
Gauss units of the 5th decimal

φ	$\lambda=0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+90°	-239	-174	-95	-14	+70	+151	+219	+273	+311	+323	+314	+287	+239	+174	+95	+14	-70	-151	-219	-273	-311	-323	-316	-287
+80	-154	-168	-154	-123	-83	-38	+19	+72	+116	+147	+159	+159	+137	+112	+75	+40	+14	-7	-14	-16	-37	-54	-58	-121
+70	-184	-212	-217	-182	-131	-65	+5	+75	+139	+188	+193	+174	+142	+95	+64	+19	+5	+5	+19	+32	+32	0	-58	-183
+60	-234	-272	-283	-234	-168	-97	-12	+79	+163	+212	+224	+191	+142	+88	+37	+2	-14	0	+40	+93	+121	+86	-5	-131
+50	-260	-348	-343	-283	-205	-112	-32	+56	+144	+219	+250	+214	+139	+70	+14	-23	-32	-9	+61	+149	+205	+186	+61	-112
+40	-271	-393	-409	-330	-224	-128	-49	+30	+116	+228	+250	+212	+119	+30	-14	-37	-32	+7	+95	+212	+287	+260	+126	-81
+30	-264	-406	-439	-366	-237	-126	-54	+9	+88	+191	+253	+226	+139	+25	-49	-75	-65	-5	+100	+252	+334	+325	+188	-30
+20	-228	-411	-461	-393	-239	-102	-35	-19	+35	+137	+237	+257	+177	+44	-61	-110	-100	-42	+77	+237	+340	+373	+250	+16
+10	-163	-378	-458	-398	-207	-67	-16	-44	-15	+38	+201	+262	+205	+63	-75	-142	-142	-30	+30	+193	+346	+406	+316	+108
0	-100	-316	-413	-323	-147	-7	+14	-56	-81	-7	+131	+228	+198	+70	-65	-136	-134	-147	-37	+133	+319	+411	+362	+168
-10	-14	-257	-348	-278	-114	+30	+44	-40	-114	-83	+42	+137	+139	+54	-61	-139	-134	-188	-114	+38	+280	+446	+441	+262
-20	+79	-170	-269	-221	-86	+23	+40	-28	-95	-105	-37	+35	+47	-2	-70	-142	-207	-250	-193	-5	+266	+495	+535	+360
-30	+205	-75	-217	-214	-119	-19	+16	-9	-63	-88	-67	-47	-37	-47	-86	-144	-239	-316	-276	-75	+253	+540	+630	+493
-40	+318	+32	-168	-232	-198	-112	-35	0	-2	-28	-56	-70	-77	-83	-116	-191	-300	-385	-336	-167	+257	+581	+711	+595
-50	+395	+102	-142	-264	-269	-196	-93	0	+61	+70	+49	+5	-37	-83	-149	-250	-376	-446	-380	-139	+224	+558	+718	+646
-60	+388	+128	-114	-257	-295	-232	-114	+14	+123	+166	+156	+105	+30	-58	-166	-290	-402	-450	-369	-149	+166	+448	+606	+570
-70	+276	+93	-86	-209	-246	-201	-88	+42	+154	+214	+221	+186	+100	-14	-151	-278	-371	-390	-307	-131	+93	+292	+402	+395
-80	+123	+49	-32	-86	-105	-83	-19	+65	+144	+198	+205	+170	+95	+2	-102	-188	-246	-250	-209	-121	-9	+90	+154	+166
-90	-28	-49	+35	+116	+191	+250	+294	+318	+320	+300	+257	+203	+128	+49	-35	-116	-191	-250	-295	-318	-320	-300	-257	-203

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TABLE (45). Secular changes ΔZ between 1550-1600 when the time is increased by one year. Gauss units of the 5th decimal. For $\varphi = +90°$, $\Delta Z = +0.00070$; for $\varphi = -90°$, $\Delta Z = +0.00036$.

φ'	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+48	+60	+78	+100	+128	+168	+200	+224	+232	+220	+190	+140	+88	+32	-18	-52	-84	-92	-88	-68	-44	-16	+14	+52
+70	+30	+14	+2	+13	+56	+134	+236	+328	+380	+372	+314	+210	+90	-26	-122	-196	-232	-242	-212	-158	-92	-28	+14	+34
+60	+58	-16	-100	-150	-132	-32	+138	+316	+432	+454	+380	+248	+98	-44	-148	-238	-306	-316	-270	-168	-48	+54	+108	+108
+50	+150	+96	-146	-308	-382	-284	-66	+180	+362	+416	+378	+258	+118	-18	-98	-176	-238	-292	-266	-140	+34	+180	+234	+214
+40	+280	+134	-134	-420	-576	-512	-274	+4	+200	+300	+318	+256	+140	+24	-50	-84	-132	-220	-226	-96	+120	+306	+370	+356
+30	+404	+222	-184	-482	-704	-646	-402	-154	+30	+146	+248	+258	+148	+6	-60	-42	-44	-118	-158	-50	+184	+402	+494	+482
+20	+480	+282	-82	-508	-740	-662	-392	-186	-84	+24	+198	+282	+160	-70	-116	-80	+20	-14	-104	-42	+204	+464	+586	+570
+10	+474	+262	-124	-548	-752	-600	-306	-152	-140	-68	+152	+324	+134	-150	-224	-140	+54	+56	-74	-56	+196	+432	+624	+586
0	+412	+198	-168	-562	-726	-542	-222	-98	-162	-146	+40	+282	+168	-142	-228	-122	+104	+94	-86	-102	+170	+340	+640	+566
-10	+346	+116	-210	-570	-716	-538	-226	-114	-204	-226	-22	+208	+186	-90	-138	+2	+168	+94	-122	-138	+168	+530	+666	+540
-20	+296	+56	-250	-572	-728	-592	-328	-220	-296	-328	-146	+116	+212	+140	+102	+176	+212	+52	-156	-120	+220	+588	+694	+536
-30	+288	+24	-262	-558	-720	-654	-462	-358	-384	-398	-246	+14	+220	+248	+310	+306	+208	-2	-158	-50	+328	+664	+742	+560
-40	+310	+92	-248	-534	-700	-684	-558	-458	-432	-402	-260	-26	+198	+338	+374	+302	+140	-52	-126	+44	+392	+698	+736	+586
-50	+310	+32	-230	-462	-684	-620	-544	-460	-400	-338	-242	-40	+138	+256	+278	+198	+60	-60	-52	+132	+424	+658	+710	+552
-60	+274	+54	-160	-334	-438	-468	-450	-364	-302	-238	-152	-42	+66	+134	+140	+86	+10	-24	+34	+184	+378	+526	+556	+462
-70	+202	+66	-66	-170	-238	-266	-260	-238	-190	-142	-82	-30	+18	+46	+48	+34	+26	+42	+96	+184	+242	+330	+346	+310
-80	+112	+66	+20	-26	-58	-80	-86	-84	-70	-50	-36	-18	0	+14	+20	+34	+50	+72	+94	+124	+110	+162	+164	+146

TABLE (45). Secular changes ΔZ between 1600-1650 when the time is increased by one year. Gauss units of the 5th decimal. For $\varphi = +90°$ $\Delta Z = +0.00088$; ; for $\varphi = -90°$, $\Delta Z = +0.00046$.

φ'	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+30°	+42	+28	+62	+86	+124	+156	+198	+228	+240	+230	+198	+156	+98	+44	-2	-34	-48	-48	-34	-16	+4	+22	+30	+40
+70	-14	-34	-78	-60	-6	+96	+220	+332	+386	+384	+306	+198	+74	-34	-118	-164	-174	-152	-104	-36	+34	+64	+66	+34
+60	-18	-140	-252	-314	-282	-126	+96	+310	+458	+446	+352	+196	+34	-88	-160	-190	-186	-158	-80	+10	+134	+186	+164	+88
+50	+28	-152	-340	-528	-558	-402	-110	+186	+370	+400	+300	+146	0	-82	-100	-88	-78	-54	+18	+150	+282	+344	+304	+182
+40	+142	-80	-370	-652	-770	-632	-312	+4	+198	+252	+198	+84	-46	-112	-78	+20	+90	+96	+136	+260	+426	+508	+458	+316
+30	+230	-6	-356	-718	-880	-722	-382	-94	+32	+64	+80	+38	-82	-178	-124	+70	+252	+266	+250	+334	+504	+618	+560	+410
+20	+260	+24	-338	-728	-874	-652	-286	-68	-54	-56	+18	+32	-136	-336	-310	-72	+298	+320	+322	+348	+526	+668	+622	+478
+10	+224	-16	-358	-722	-798	-484	-76	+72	-54	-130	-18	+50	-160	-482	-510	-196	+314	+448	+334	+292	+474	+652	+630	+434
0	+144	-88	-400	-716	-728	-342	+100	+302	-24	-180	-80	+24	-168	-516	-564	-156	+314	+442	+268	+194	+356	+628	+620	+388
-10	+64	-160	-432	-680	-664	-282	+144	+330	-28	-244	-180	-40	-136	-376	-392	-40	+328	+362	+152	+90	+332	+612	+604	+352
-20	+32	-190	-412	-634	-646	-340	+38	+132	-102	-330	-300	-122	-60	-130	-92	+162	+318	+228	+6	+12	+334	+646	+644	+344
-30	+30	-170	-392	-586	-632	-424	-142	-52	-204	-378	-356	-166	+2	+94	+176	+266	+256	+76	-94	+16	+372	+690	+700	+418
-40	+62	-122	-360	-548	-604	-490	-292	-198	-260	-364	-344	-178	+30	+182	+264	+252	+124	-58	-184	+66	+444	+740	+758	+494
-50	+228	-96	-282	-450	-514	-450	-336	-250	-254	-250	-266	-158	+16	+142	+186	+130	+2	-110	-88	+130	+454	+690	+706	+518
-60	+250	+30	-164	-294	-356	-334	-276	-226	-200	-184	-152	-86	-10	+46	+52	-2	-68	-98	-28	+158	+384	+546	+568	+390
-70	+206	+94	-24	-116	-170	-176	-156	-124	-106	-88	-76	-54	-34	-26	-30	-44	-58	-36	+32	+144	+262	+344	+360	+246
-80	+126	+82	+38	0	-22	-38	-38	-34	-30	-24	-18	-10	-10	-10	-6	-4	+6	+30	+66	+106	+142	+172	+178	+162

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TABLE (45) Secular change ΔZ between 1650-1700 when the time is increased by one year. G. units of the 5th decimal. For $\varphi = +90°$, $\Delta Z = -0,00038$; for $\varphi = -90°$, $\Delta Z = +0,00106$.

φ	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-26	-36	-46	-52	-62	-46	-86	-102	-114	-120	-114	-104	-74	-40	-2	+36	+62	+78	+82	+74	+58	+32	+10	-12
+70	-52	-78	-84	-78	-56	-42	-54	-90	-132	-182	-192	-170	-112	-30	+64	+150	+212	+238	+234	+192	+136	+78	+20	-26
+60	-130	-192	-220	-182	-78	+20	+62	+28	-74	-162	-208	-266	-154	-52	+80	+222	+322	+392	+382	+320	+214	+104	+12	-60
+50	-164	-322	-446	-416	-198	+64	+208	+188	+66	-48	-142	-206	-228	-158	-2	+204	+366	+472	+512	+468	+350	+188	+54	-72
+40	-162	-454	-738	-762	-438	+24	+320	+352	+234	+110	-10	-178	-342	-358	-186	+82	+306	+478	+592	+620	+514	+382	+142	+14
+30	-60	-500	-976	-1098	-700	-72	+348	+416	+332	+266	+132	-156	-484	-604	-408	-82	+204	+424	+636	+724	+732	+566	+308	+156
+20	+76	-466	-1116	-1348	-936	-218	+266	+362	+324	+324	+220	-138	-538	-758	-528	-152	+140	+370	+662	+926	+936	+696	+448	+306
+10	+180	-404	-1160	-1492	-1166	-330	+114	+212	+206	+268	+212	-198	-612	-764	-532	-100	+158	+360	+694	+1040	+1110	+852	+560	+408
0	+196	-374	-1176	-1478	-1162	-506	-64	+10	+10	+102	+124	-150	-516	-602	-324	+26	+226	+336	+728	+1102	+1158	+926	+596	+422
-10	+144	-362	-1022	-1368	-1124	-578	-212	-182	-228	-144	-54	-150	-336	-342	-102	+152	+288	+434	+764	+1134	+1216	+936	+578	+366
-20	+72	-368	-900	-1176	-938	-592	-338	-356	-430	-372	-228	-168	-168	-92	+80	+228	+314	+468	+786	+1112	+1168	+904	+552	+316
-30	+36	-324	-730	-994	-836	-574	-432	-498	-596	-570	-398	-212	-60	+60	+162	+230	+284	+446	+752	+1034	+1084	+862	+550	+292
-40	+66	-222	-506	-672	-646	-528	-496	-584	-698	-668	-494	-246	-34	+102	+162	+184	+236	+400	+664	+896	+946	+796	+550	+310
-50	+150	-82	-292	-430	-476	-484	-518	-608	-680	-646	-492	-270	-70	+66	+116	+138	+196	+348	+558	+764	+800	+722	+556	+368
-60	+228	+66	-90	-222	-308	-376	-446	-518	-552	-522	-414	-254	-104	+6	+66	+126	+196	+316	+466	+592	+648	+618	+518	+382
-70	+252	+134	+28	-72	-156	-232	-296	-344	-360	-336	-272	-182	-88	-2	+64	+128	+204	+284	+372	+444	+480	+472	+444	+346
-80	+206	+156	+100	+46	-10	-52	-94	-120	-126	-118	-88	-56	-10	+36	+84	+130	+178	+220	+258	+288	+302	+302	+290	+248

TABLE (45) Secular change ΔZ between 1700-1780 when the time is increased by one year. G. units of the 5th decimal. For $\varphi = +90°$, $\Delta Z = -0,00295$; for $\varphi = -90°$, $\Delta Z = +0,00291$.

φ	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-444	-438	-405	-344	-266	-180	-[illegible]	-[illegible]	+54	+60	+60	+44	+15	-19	-52	-87	-121	-157	-200	-248	-296	-348	-392	-426
+70	-576	-610	-577	-473	-306	-111	+35	+216	+288	+300	+248	+142	+73	+15	-15	-27	-36	-44	-81	-131	-195	-285	-385	-492
+60	-935	-691	-655	-537	-321	-48	+205	380	+479	+395	+252	+75	-60	-121	-97	-32	+39	+75	+89	+82	+49	-35	-175	-361
+50	-410	-602	-665	-567	-338	-36	+244	+424	+449	+327	+105	-144	-314	-355	-255	-87	+69	+174	+235	+283	+311	+262	+105	-142
+40	-270	-520	-634	-571	-348	-50	+229	+370	+348	+179	-89	-335	-560	-564	-393	-136	+85	+250	+336	+445	+530	+504	+331	+45
+30	-191	-471	-631	-596	-335	-66	+192	+309	+245	+51	-229	-518	-701	-676	-461	-166	+77	+249	+355	+543	+647	+676	+526	+136
+20	-150	-460	-670	-670	-432	-82	+188	+286	+201	+7	-257	-535	-697	-650	-423	-139	+85	+257	+438	+614	+705	+648	+439	+164
+10	-99	-454	-728	-757	-596	-115	+171	+273	+216	+48	-204	-496	-583	-496	-267	-53	+101	+260	+476	+677	+734	+627	+430	+195
0	-34	-437	-781	-836	-571	-183	+101	+291	+213	+164	-114	-337	-414	-382	-71	+59	+114	+243	+396	+734	+784	+648	+456	+252
-10	+11	-423	-790	-866	-638	-299	-60	+69	+132	+106	-42	-220	-243	-82	+95	+136	+97	+193	+477	+761	+837	+709	+523	+320
-20	+34	-386	-730	-811	-646	-424	-271	-158	-41	+25	-27	-121	-106	+41	+160	+127	+41	+129	+443	+773	+901	+797	+602	+366
-30	+44	-326	-601	-674	-604	-516	-462	-381	-243	-111	-79	-94	-61	+44	+99	+31	-39	+84	+425	+789	+961	+889	+676	+391
-40	+115	-193	-401	-479	-489	-517	-554	-535	-423	-286	-203	-174	-135	-79	-64	-104	-100	+85	+449	+887	+1013	+984	+764	+456
-50	+291	+47	-125	-229	-308	-407	-505	-544	-506	-418	-342	-301	-271	-246	-223	-191	-89	+152	+518	+855	+1054	+1044	+860	+586
-60	+306	+387	+150	+29	-91	-213	-354	-439	-462	-446	-414	-387	-361	-327	-270	-174	+2	+255	+558	+835	+1007	+1031	+925	+727
-70	+636	+495	+363	+235	+104	-27	-146	-239	-301	-332	-338	-327	-299	-248	-166	-45	+126	+335	+554	+743	+866	+907	+869	+770
-80	+568	+491	+414	+329	+243	+160	+84	+17	-34	-66	-82	-76	-52	-6	+57	+143	+243	+350	+456	+548	+611	+644	+645	+616

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TABLE (45). Secular change ΔZ between 1780-1842 when the time is increased by one year. G units of the 5th decimal. For $\varphi = +90°$, $\Delta Z = +0{,}00065$; for $\varphi = -90°$, $\Delta Z = -0{,}00253$.

φ	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+179	+126	+68	+15	-31	-61	-90	-110	-124	-134	-142	-145	-137	-119	-84	-37	+21	+87	+152	+206	+244	+260	+255	+222
+70	+189	+85	-8	-89	-148	-185	-203	-207	-215	-230	-250	-272	-301	-314	-304	-244	-139	+2	+155	+282	+361	+382	+344	+276
+60	+88	-21	-106	-155	-177	-180	-171	-161	-158	-174	-215	-263	-331	-405	-461	-438	-312	-103	+123	+296	+384	+381	+312	+204
+50	-77	-166	-174	-127	-60	-3	+43	+68	+60	+11	-52	-111	-193	-304	-422	-469	-369	-145	+111	+293	+350	+314	+203	+60
+40	-304	-373	-271	-63	+127	+255	+328	+361	+334	+244	+145	+105	+79	-8	-164	-288	-251	-68	+144	+271	+276	+211	+77	-118
+30	-600	-674	-443	-55	+303	+475	+567	+605	+565	+438	+321	+309	+374	+361	+207	+29	-83	+66	+182	+223	+199	+135	-27	-312
+20	-958	-1057	-702	-126	+331	+538	+613	+664	+647	+529	+401	+424	+565	+627	+508	+303	+191	+199	+219	+190	+153	+94	-111	-310
+10	-1293	-1421	-960	-253	+260	+456	+505	+556	+576	+489	+389	+417	+565	+650	+556	+385	+292	+269	+237	+182	+169	+127	-147	-224
0	-1441	-1582	-1089	-349	+158	+309	+314	+355	+397	+349	+276	+298	+405	+553	+382	+284	+271	+292	+288	+264	+277	+239	-105	-282
-10	-1308	-1446	-992	-331	+95	+179	+137	+150	+195	+182	+131	+126	+158	+152	+95	+89	+195	+328	+398	+427	+475	+421	+58	-651
-20	-891	-1031	-705	-215	+79	+110	+39	+10	+18	+3	-27	-47	-69	-124	-160	-90	+115	+349	+510	+610	+672	+613	+266	-341
-30	-387	-519	-342	-66	+92	+82	+2	-60	-89	-115	-135	-164	-212	-284	-303	-191	+50	+321	+527	+669	+747	+714	+457	+19
-40	-11	-118	-71	+31	+77	+45	-18	-74	-110	-144	-164	-188	-240	-304	-323	-233	-32	+196	+385	+516	+600	+605	+473	+223
-50	+74	+5	-6	+6	+3	-26	-60	-90	-106	-123	-139	-156	-203	-256	-296	-268	-171	-45	+75	+174	+255	+293	+268	+175
-60	-95	-113	-127	-135	-137	-135	-135	-129	-131	-129	-140	-164	-204	-258	-311	-342	-347	-320	-274	-222	-166	-116	-85	-77
-70	-376	-352	-337	-321	-308	-288	-271	-250	-230	-210	-223	-252	-292	-345	-405	-462	-511	-537	-545	-530	-505	-465	-433	-400
-80	-563	-537	-514	-487	-462	-441	-422	-406	-395	-397	-405	-421	-446	-479	-518	-554	-584	-613	-632	-642	-637	-626	-608	-589

TABLE (45) Secular change ΔZ between 1842-1885 when the time is increased by one year. G. units of the 5th decimal For $\varphi = +90°$, $\Delta Z = -0{,}00504$) ; for $\varphi = -90°$, $\Delta Z = -0{,}00232$.

φ	$\lambda = 0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-320	-311	-300	-300	-297	-307	-318	-334	-353	-373	-390	-404	-418	-423	-430	-420	-413	-400	-383	-371	-357	-346	-341	-330
+70	-291	-188	-156	-128	-114	-114	-126	-156	-198	-248	-306	-346	-378	-402	-402	-397	-369	-336	-307	-285	-276	-276	-266	-253
+60	-201	-102	-7	+61	+97	+112	+114	+93	+37	-43	-147	-241	-307	-339	-346	-315	-302	-264	-239	-228	-250	-283	-300	-273
+50	-273	-95	+77	+205	+273	+307	+318	+298	+228	+112	-30	-141	-209	-221	-221	-214	-196	-168	-151	-182	-269	-380	-439	-402
+40	-458	-209	+49	+243	+366	+416	+448	+439	+380	+248	+77	-79	-156	-163	-133	-110	-79	-54	-58	-142	-297	-495	-626	-619
+30	-679	-406	-81	+201	+343	+448	+467	+472	+446	+339	+161	-25	-139	-156	-119	-56	+5	+54	+44	-67	-292	-567	-769	-815
+20	-855	-579	-214	+126	+339	+402	+409	+423	+441	+395	+232	+2	-191	-257	-209	-100	+14	+100	+97	-16	-264	-574	-844	-951
+10	-925	-669	-302	+52	+250	+283	+248	+260	+330	+371	+255	+14	-241	-376	-357	-228	-83	+47	+90	+25	-191	-502	-795	-958
0	-901	-630	-343	-23	+137	+105	+2	-16	+86	+207	+183	-21	-278	-443	-446	-336	-193	-40	+63	+63	-36	-364	-674	-890
-10	-827	-660	-366	-107	-21	-100	-248	-295	-198	-47	+28	-56	-219	-343	-371	-302	-188	-30	+133	+230	+147	-112	-479	-752
-20	-711	-626	-397	-201	-149	-230	-366	-425	-357	-214	-95	-61	-93	-119	-128	-95	-14	+156	+390	+574	+549	+269	-170	-551
-30	-555	-551	-402	-237	-154	-182	-253	-292	-269	-182	-81	+12	+37	+151	+170	+196	+283	+447	+792	+1027	+1042	+734	+230	-257
-40	-285	-404	-330	-156	+7	+110	+128	+110	+67	+63	+84	+144	+230	+307	+357	+420	+542	+737	+1137	+1411	+1439	+1142	+619	+93
-50	-5	-151	-107	+67	+280	+463	+560	+560	+486	+383	+297	+253	+255	+280	+325	+441	+588	+876	+1216	+1476	+1518	+1276	+831	+350
-60	+214	+106	+139	+294	+502	+683	+797	+804	+725	+574	+413	+271	+182	+137	+144	+230	+404	+669	+946	+1162	+1214	+1077	+790	+467
-70	+304	+262	+306	+397	+535	+662	+734	+731	+651	+509	+350	+198	+81	+7	-7	+44	+159	+313	+488	+616	+674	+640	+537	+406
-80	+246	+255	+280	+320	+360	+395	+402	+385	+341	+278	+203	+121	+56	+5	-16	-9	+25	+79	+142	+201	+239	+255	+257	+250

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TABLE (46). Secular changes Δδ between 1550-1600 when time is increased by one year. Minutes

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-1,60	-1,60	-3,18	-6,10	-8,32	-8,76	-7,60	-5,64	-3,28	-0,82	+1,58	+4,30	+6,78	+9,42	+14,12	+28,00		-29,30	-16,44	-10,72	-7,42	-5,30	-3,66	-2,38
+70	+3,44	+5,66	+5,10	-0,40	-4,86	-9,08	-8,16	-5,84	-3,19	-0,40	+2,10	+4,32	+6,24	+8,10	+10,10	+11,84	+6,34	-8,46	-9,04	-6,92	-4,68	-2,44	-0,92	+1,12
+60	+4,34	+7,08	+7,86	+2,98	-3,84	-7,30	-7,48	-5,94	-3,56	-0,82	+1,48	+3,12	+4,10	+4,52	+4,32	+3,70	+1,84	-1,70	-4,74	-5,10	-3,94	-2,30	-0,38	+1,88
+50	+4,12	+6,72	+7,90	+4,48	-1,34	-4,96	-6,00	-5,24	-3,46	-1,32	+0,56	+1,96	+2,58	+2,68	+2,12	+1,60	+0,86	-0,52	-2,62	-3,98	-3,74	-2,30	-0,36	+1,76
+40	+3,74	+6,10	+7,52	+4,98	+0,10	-3,30	-4,54	-4,22	-3,02	-1,60	-0,16	+1,04	+1,88	+1,90	+1,14	+0,56	+0,48	-0,10	-1,54	-3,18	-3,58	-2,54	-0,56	+1,52
+30	+3,40	+5,64	+6,86	+4,86	+0,76	-2,24	-3,40	-3,20	-2,50	-1,86	-0,90	+0,38	+1,74	+1,80	+0,60	-0,16	+0,08	+0,12	-0,92	-2,64	-3,44	-2,62	-0,64	+1,38
+20	+3,14	+5,38	+6,54	+4,52	+0,82	-1,88	-2,76	-2,30	-1,92	-2,06	-1,56	-0,02	+1,84	+2,00	+0,24	-0,86	-0,42	+0,14	-0,48	-2,20	-3,32	-2,64	-0,64	+1,42
+10	+3,34	+5,36	+6,16	+4,22	+0,46	-1,96	-2,60	-1,70	-1,36	-2,10	-2,08	-0,32	+1,68	+1,88	-0,06	-1,36	-0,70	+0,34	-0,06	-1,94	-3,26	-2,58	-0,44	+1,78
0	+3,84	+5,34	+5,92	+4,06	+0,52	-2,26	-2,72	-1,36	-0,80	-1,96	-2,32	-0,68	+1,30	+1,56	-0,06	-1,46	-0,80	+0,50	+0,18	-1,92	-3,46	-2,70	-0,26	+2,06
-10	+4,26	+5,38	+5,78	+4,08	+0,70	-2,90	-3,06	-1,34	-0,66	-1,98	-2,68	-1,30	+0,54	+0,92	-0,22	-1,12	-0,36	+1,00	+0,32	-2,26	-3,96	-2,80	+0,14	+2,64
-20	+4,78	+5,62	+5,94	+4,48	+1,18	-2,38	-3,33	-1,66	-0,78	-2,06	-3,14	-2,16	-0,56	+0,06	-0,32	-0,64	+0,44	+1,36	+0,12	-2,84	-4,48	-2,94	+0,40	+3,14
-30	+5,40	+6,24	+6,44	+5,08	+1,96	-1,50	-3,16	-2,12	-1,38	-2,62	-3,98	-3,42	-1,86	-0,68	-0,36	+0,18	+1,34	+1,64	-0,48	-3,74	-5,18	-3,04	+0,74	+3,70
-40	+6,18	+6,92	+6,88	+5,66	+3,14	-0,08	-2,24	-2,42	-2,14	-3,22	-4,82	-4,78	-3,38	-1,72	-0,34	+1,04	+1,86	+1,30	-1,46	-4,76	-5,62	-3,66	+1,48	+4,58
-50	+6,92	+7,44	+7,34	+6,24	+4,30	+1,74	-0,40	-1,56	-2,54	-4,36	-6,28	-6,54	-4,80	-2,50	-0,18	+1,46	+1,80	+0,36	-2,76	-5,82	-5,60	-1,78	+2,54	+5,46
-60	+7,52	+7,78	+7,60	+6,66	+5,32	+3,40	+1,80	+0,22	-2,04	-5,06	-8,04	-8,16	-6,28	-3,30	-0,68	+0,78	+0,70	-1,44	-4,44	-6,20	-4,38	+0,12	+3,96	+6,24
-70	+8,16	+8,28	+8,10	+7,44	+6,60	+5,60	+4,50	+3,34	+0,86	-3,62	-10,06	-12,92	-10,38	-6,50	-3,42	-2,18	-2,78	-4,50	-5,96	-4,88	-0,70	+3,42	+6,12	+7,60
-80	+9,50	+9,48	+9,30	+9,02	+8,72	+8,64	+8,42	+8,38	+8,30	+7,88	+5,94	-0,70	-28,08		-30,08	-10,76	-3,68	-0,10	+2,96	+5,32	+7,12	+8,46	+9,04	+9,44

Für $\varphi = +90°$ ist $\Delta\delta = -10'38$; für $\varphi = -90°$ ist $\Delta\delta = +14'34$.

TABLE (46). Secular changes Δδ between 1600-1650 when time is increased by one year. Minutes. For $\varphi = +90°$, $\Delta\delta = -7,06$. ; for $\varphi = -90°$, $\Delta\delta = +11'26$.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+5,12	+3,78	+0,92	-3,62	-7,68	-10,20	-9,86	-7,89	-4,96	-1,78	+1,84	+5,12	+8,06	+11,36	+15,54	+28,72		-13,32	-5,02	-1,04	+0,26	+2,58	+3,94	+5,12
+70	+9,32	+9,22	+5,74	-0,92	-7,04	-9,92	-9,74	-7,44	-3,88	-0,16	+2,96	+4,92	+6,18	+6,38	+5,54	+2,56	-5,44	-8,66	-4,98	-1,06	+1,28	+3,54	+5,66	+7,78
+60	+9,64	+10,46	+8,02	+1,44	-4,84	-7,98	-8,10	-6,22	-3,14	-0,10	+2,36	+3,68	+3,78	+2,62	+0,84	-1,48	-3,10	-4,24	-4,68	-2,76	-0,10	+2,62	+5,36	+7,24
+50	+8,24	+9,26	+8,00	+3,04	-2,52	-5,78	-6,48	-5,22	-2,84	-0,22	+1,74	+2,72	+2,52	+0,98	-1,04	-2,36	-2,46	-2,64	-3,06	-2,90	-1,32	+1,30	+4,22	+6,52
+40	+6,70	+7,84	+7,28	+3,62	-1,10	-4,20	-5,00	-3,90	-2,04	-0,28	+1,00	+1,82	+1,80	+0,30	-1,78	-2,64	-2,22	-1,62	-1,96	-2,48	-1,86	+0,48	+3,38	+5,52
+30	+5,62	+6,72	+6,74	+3,66	-0,58	-3,40	-3,98	-2,80	-1,32	-0,46	+0,28	+1,08	+1,76	+0,52	-2,16	-3,16	-2,36	-1,26	-1,14	-1,86	-1,82	+0,04	+2,60	+4,54
+20	+4,38	+5,96	+5,94	+3,36	-0,48	-3,06	-3,34	-1,78	-0,48	-0,38	-0,20	+0,96	+2,00	+0,72	-2,44	-3,86	-2,78	-0,94	-0,56	-1,46	-1,88	-0,34	+2,26	+4,06
+10	+3,72	+5,36	+5,28	+2,88	-0,74	-3,30	-3,16	-0,94	+0,36	-0,22	-0,56	+0,60	+2,04	+1,02	-2,32	-4,24	-3,10	-0,78	-0,12	-1,28	-1,26	-0,56	+2,08	+3,96
0	+3,66	+5,34	+4,74	+2,50	-1,04	-3,80	-3,30	-0,36	+1,18	+0,12	-0,74	+0,72	+1,60	+0,82	-2,18	-4,22	-3,16	-0,52	+0,22	-1,20	-2,12	-0,70	+2,16	+4,18
-10	+4,98	+4,90	+4,50	+2,42	-1,28	-4,42	-3,70	+0,02	+1,82	+0,54	-0,90	-0,30	+0,80	+0,26	-2,12	-3,78	-2,54	-0,02	+0,58	-1,54	-3,72	-1,10	+2,16	+4,52
-20	+5,42	+5,08	+4,54	+2,62	-1,10	-4,38	-3,96	-0,12	+1,92	+0,44	-1,16	-1,28	-0,44	-0,64	-2,12	-2,90	-1,56	+0,36	+0,04	-2,34	-3,44	-1,26	+2,40	+4,98
-30	+6,08	+5,70	+4,96	+3,14	-0,30	-3,92	-4,08	-0,80	+1,58	+0,56	-1,62	-2,36	-1,88	-1,74	-2,04	-1,76	-0,36	+0,66	-0,64	-3,44	-4,22	-1,50	+2,58	+5,38
-40	+6,66	+6,38	+5,58	+3,82	+0,84	-2,44	-3,42	-1,26	+0,78	-0,02	-2,38	-3,70	-3,30	-2,54	-1,68	-0,48	+0,70	+0,56	-1,72	-4,74	-4,68	-1,32	+2,90	+5,76
-50	+7,22	+7,08	+6,28	+4,72	+2,30	-0,28	-1,74	-1,12	-0,02	-0,92	-3,48	-4,72	-4,24	-2,80	-1,30	+0,16	+0,74	-0,46	-3,46	-5,98	-4,86	-0,76	+3,42	+6,18
-60	+7,42	+7,54	+6,92	+5,84	+4,00	+2,17	+0,64	0,00	-0,22	-2,18	-5,18	-6,36	-5,24	-3,22	-1,30	-0,16	-0,40	-2,34	-5,30	-6,30	-3,54	+0,56	+4,14	+6,52
-70	+7,46	+7,62	+7,36	+6,72	+5,88	+4,70	+3,88	+3,00	+2,34	-0,24	-5,60	-8,32	-7,34	-5,20	-3,28	-2,80	-3,82	-5,82	-6,60	-4,48	-0,92	+2,60	+5,18	+6,66
-80	+7,98	+8,12	+8,10	+8,10	+7,96	+7,64	+7,84	+8,28	+9,28	+10,98	+13,94	+12,80	-61,62	-41,80	-17,92	-10,96	-6,66	-2,88	+0,44	+2,82	+4,62	+5,90	+6,98	+7,62

secular changes Δδ of declination δ

TABLE (46) Secular changes $\Delta\delta$ in minutes between 1650-1700 when time is increased by one year. For $\varphi = +90°$, $\Delta\delta = +14'.90$; for $\varphi = -90°$, $\Delta\delta = +20'.98$.

φ	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+12,76	+9,80	+7,28	+4,98	+3,08	+2,10	+1,38	+0,66	-0,02	-1,04	-2,74	-5,28	-8,08	-12,46	-19,78	-36,44		+73,16	+46,12	+27,80	+22,16	+18,68	+16,54	+14,96
+70	+9,80	+7,14	+3,52	-0,38	-2,48	-2,42	-4,00	+0,40	+1,04	+0,62	-0,76	-2,40	-4,92	-8,18	-13,16	-20,56	-28,22	-9,62	+47,30	+17,24	+15,68	+13,88	+12,80	+11,36
+60	+9,46	+7,32	+2,38	-2,74	-4,98	-4,46	-2,14	+0,12	+1,00	+1,44	+0,64	-0,46	-2,10	-4,50	-7,56	-10,44	-11,38	-6,72	+2,60	+8,90	+10,84	+11,14	+10,76	+10,70
+50	+9,66	+8,06	+2,58	-3,44	-6,32	-5,52	-2,84	-0,26	+1,22	+1,56	+1,48	+1,10	-0,12	-2,62	-5,34	-7,02	-7,10	-5,36	-1,34	+3,80	+7,44	+9,02	+9,20	+9,40
+40	+9,36	+8,72	+3,84	-3,10	-6,82	-6,28	-3,46	-0,76	+0,64	+1,22	+1,90	+2,40	+1,54	-1,34	-4,48	-5,72	-5,38	-4,56	-2,72	+0,78	+4,66	+7,02	+7,46	+8,04
+30	+9,00	+9,34	+4,80	-2,30	-6,76	-6,64	-3,76	-1,08	+0,22	+0,88	+2,20	+3,62	+2,50	-1,10	-4,44	-5,28	-4,72	-4,16	-3,30	-0,86	+2,66	+5,34	+6,12	+6,98
+20	+8,36	+9,68	+5,86	-1,33	-6,52	-6,96	-4,02	-1,22	-0,20	+0,48	+2,18	+3,66	+2,58	-1,26	-4,44	-4,96	-4,22	-3,98	-3,56	-1,60	+1,82	+4,52	+5,30	+6,04
+10	+7,90	+10,00	+6,78	-0,14	-5,88	-6,96	-4,16	-1,40	-0,56	+0,06	+1,84	+3,34	+2,00	-1,56	-4,32	-4,62	-3,98	-3,76	-3,88	-2,60	+1,32	+4,14	+4,92	+5,44
0	+7,56	+9,66	+7,38	+1,04	-4,92	-6,62	-4,04	-1,34	-0,88	-0,50	+1,10	+2,26	+1,00	-1,96	-4,06	-4,18	-3,56	-3,20	-4,12	-2,32	+1,24	+4,12	+4,88	+5,28
-10	+7,43	+9,42	+7,64	+2,08	-3,32	-6,12	-3,72	-1,20	-0,98	-0,96	+0,18	+0,98	-0,10	-2,26	-3,76	-3,80	-3,48	-4,14	-4,76	-2,40	+1,46	+4,50	+5,22	+5,48
-20	+7,62	+9,22	+7,84	+3,08	-2,44	-5,02	-3,14	-1,02	-1,04	-1,62	-1,22	-0,74	-1,38	-2,66	-3,50	-3,32	-3,34	-4,20	-4,50	-2,22	+1,86	+4,86	+5,78	+6,06
-30	+7,96	+8,98	+7,98	+4,22	-0,58	-3,18	-2,24	-0,70	-1,06	-2,24	-2,64	-2,58	-2,76	-3,12	-3,18	-3,06	-3,56	-4,70	-4,70	-2,02	+2,18	+5,14	+6,22	+6,78
-40	+8,14	+8,62	+8,16	+5,56	+1,82	-0,58	-0,46	+0,16	-0,98	-3,28	-4,76	-4,76	-4,32	-3,72	-3,18	-3,28	-4,16	-5,28	-4,94	-1,78	+2,42	+5,32	+6,52	+7,20
-50	+8,18	+8,60	+8,22	+6,70	+4,52	+2,76	+2,12	+1,64	-0,42	-4,82	-7,88	-7,76	-6,36	-4,98	-4,14	-4,26	-5,12	-5,80	-4,70	-0,98	+3,02	+5,60	+6,82	+7,52
-60	+8,56	+8,76	+8,60	+7,88	+7,08	+6,38	+6,02	+5,48	+2,40	-5,82	-12,46	-12,22	-9,76	-7,72	-6,54	-6,40	-6,98	-6,86	-4,56	-0,22	+3,60	+6,02	+7,36	+8,10
-70	+9,42	+9,62	+9,80	+9,98	+10,20	+10,46	+11,26	+12,64	+12,66	+1,82	-23,80	-26,32	-20,16	-15,52	-13,12	-11,60	-10,00	-7,88	-2,22	+2,48	+5,72	+7,56	+8,52	+9,06
-80	+12,04	+12,32	+12,74	+13,30	+14,22	+15,96	+18,16	+21,90	+27,86	+40,02	+67,08				-31,74	-16,70	-5,66	+1,12	+5,30	+7,92	+9,82	+10,60	+11,36	+11,96	+11,84

TABLE (46) Secular changes $\Delta\delta$ in minutes between 1700-1780 when time is increased by one year. For $\varphi = +90°$, $\Delta\delta = -15'.99$; ; for $\varphi = -90°$, $\Delta\delta = +9'.96$.

φ	λ= 0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+1,28	-2,56	-6,96	-11,44	-15,57	-18,56	-19,71	-18,51	-15,43	-11,35	-7,70	-5,49	-5,04	-6,98	-11,31	-20,47	-22,55	+1,21	+9,71	+10,28	+10,07	+8,74	+6,73	+4,44
+70	+7,84	+2,71	-3,16	-8,53	-12,43	-14,06	-13,80	-8,96	-3,82	+0,72	+3,52	+4,15	+4,18	+2,53	-0,28	-5,29	-16,20	+14,16	+28,14	+21,13	+18,03	+16,40	+14,38	+11,83
+60	+10,52	+4,86	-1,05	-5,85	-8,81	-9,39	-7,80	-4,29	-0,37	+2,89	+4,77	+5,12	+3,97	+1,61	-1,52	-5,05	-8,46	-8,38	+2,02	+11,26	+14,76	+16,20	+16,25	+14,53
+50	+10,37	+5,61	+0,45	-3,68	-6,04	-6,41	-6,99	-4,81	+0,37	+3,21	+4,59	+4,52	+2,96	+0,21	-2,79	-4,93	-5,91	-5,64	-3,52	+0,97	+5,34	+10,75	+13,22	+13,26
+40	+9,06	+5,31	+1,02	-2,41	-4,39	-4,69	-3,95	-1,96	+1,16	+3,11	+4,18	+3,92	+1,91	-1,02	-3,64	-4,70	-4,59	-4,16	-3,41	-1,69	+1,62	+6,00	+9,58	+10,74
+30	+7,57	+5,05	+1,46	-1,76	-3,75	-3,97	-2,79	-0,84	+1,24	+2,86	+3,70	+3,16	+1,81	-1,86	-3,90	-4,32	-3,80	-3,36	-2,99	-1,97	+0,39	+3,73	+6,81	+8,26
+20	+6,69	+4,96	+1,81	-1,42	-3,46	-3,74	-2,68	-0,61	+1,15	+2,49	+3,07	+2,35	+0,17	-2,32	-3,77	-3,80	-3,52	-3,02	-2,83	-1,89	+0,19	+2,96	+5,29	+6,69
+10	+6,28	+5,06	+2,26	-1,26	-3,36	-3,71	-2,55	-0,79	+0,63	+2,06	+2,53	+1,61	-0,61	-2,49	-3,32	-3,09	-2,79	-2,93	-2,89	-1,93	+0,34	+2,25	+4,41	+5,68
0	+6,39	+5,29	+2,93	-0,81	-3,62	-3,93	-2,68	-1,05	+0,32	+1,49	+1,96	+1,10	-0,15	-2,51	-3,26	-2,90	-2,35	-2,04	-2,22	-1,99	+0,29	+2,29	+4,01	+5,32
-10	+6,69	+6,40	+3,76	-0,13	-3,24	-3,98	-2,84	-1,51	-0,32	+0,88	+1,37	+0,46	-1,27	-2,98	-2,30	-1,57	-1,97	-3,20	-3,68	-2,34	+0,19	+2,40	+3,97	+5,45
-20	+7,25	+7,05	+4,71	+1,18	-2,21	-3,51	-2,77	-2,11	-1,29	+0,07	+0,80	+0,07	-1,44	-2,27	-1,76	-1,14	-1,89	-3,71	-4,50	-3,01	-0,21	+2,40	+4,33	+6,01
-30	+7,97	+7,80	+5,95	+3,02	-0,04	-1,69	-2,12	-2,42	-2,19	-1,06	-0,09	-0,39	-1,45	-1,39	-1,39	-1,07	-2,29	-4,58	-5,50	-3,88	-0,61	+2,61	+5,06	+6,90
-40	+8,83	+8,84	+7,32	+5,35	+3,10	+1,27	-0,36	-2,00	-2,86	-2,25	-1,11	-0,71	-1,44	-1,63	-1,51	-1,85	-3,56	-5,91	-6,68	-4,67	-0,98	+2,74	+5,71	+7,80
-50	+9,34	+9,55	+8,79	+7,77	+6,44	+5,05	+3,15	+0,46	-2,39	-3,17	-2,80	-1,71	-1,94	-2,24	-2,64	-3,84	-6,06	-8,32	-8,15	-5,36	-1,14	+2,85	+6,04	+8,20
-60	+9,34	+9,94	+9,94	+9,80	+9,62	+9,43	+8,93	+7,26	+3,25	-3,37	-5,41	-4,73	-4,67	-5,19	-6,37	-8,26	-10,53	-11,08	-9,20	-5,21	-0,69	+3,15	+6,10	+8,11
-70	+9,31	+10,14	+10,73	+11,31	+11,86	+13,12	+14,79	+17,62	+23,76	+35,72	-31,52	-22,05	-17,10	-15,81	-15,99	-16,33	-15,60	-12,73	-8,38	-3,14	+0,45	+3,73	+6,23	+8,04
-80	+9,44	+10,46	+11,32	+12,31	+13,37	+14,70	+16,48	+18,88	+22,10	+25,48	+23,24	-3,01	-20,68	-21,27	-18,04	-14,00	-9,84	-5,62	-2,14	+0,86	+3,41	+5,34	+6,99	+8,29

Secular changes $\Delta\alpha$ of declination δ

TABLE (46) Secular changes Δδ in minutes between 1780 and 1842 when the time is increased by one year. For $\varphi = +90°$, $\Delta\delta = +13'32$; for $\varphi = -90°$, $\Delta\delta = -1'57$.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+7,84	+7,61	+7,18	+6,66	+6,13	+5,55	+5,15	+4,86	+4,86	+5,16	+5,55	+6,91	+7,82	+10,58	+15,36	+25,58	+35,05	+27,73	+17,57	+12,14	+9,71	+8,61	+8,05	+7,84
+70	+5,00	+4,34	+3,48	+2,19	+0,80	−0,44	−1,14	−0,93	+0,06	+0,29	+1,72	+2,16	+2,58	+2,54	+2,27	+1,23	−2,54		+2,57	+4,72	+4,76	+4,80	+5,11	+5,11
+60	+2,58	+1,45	+0,03	−1,31	−2,13	−2,64	−2,58	−1,52	+0,10	+1,20	+1,58	+1,62	+1,55	+1,32	+0,58	−1,36	−5,73	−14,44	−17,75	−5,32	+0,85	+2,24	+2,92	+3,08
+50	+1,16	−0,95	−2,64	−3,65	−3,60	−3,22	−2,16	−1,07	+0,45	+1,31	+1,31	+0,97	+0,71	+0,41	+0,19	−1,24	−1,22	−4,37	−6,44	−2,58	+1,18	+2,82	+3,35	+2,70
+40	+0,61	−2,37	−4,93	−5,94	−4,19	−3,02	−1,90	−0,61	+0,72	+1,19	+0,97	+0,19	−0,10	+0,16	+0,38	−0,64	−2,28	−3,29	−2,61	−0,50	+1,90	+3,68	+4,26	+3,11
+30	+1,10	−3,09	−5,79	−5,98	−4,42	−2,80	−1,60	−0,58	+0,53	+1,16	+0,63	−0,42	−0,77	+0,06	+0,93	+0,39	−0,92	−1,57	−0,93	+0,42	+1,88	+3,75	+5,20	+4,45
+20	+1,35	−3,24	−6,66	−6,35	−4,69	−2,56	−1,47	−0,68	+0,34	+1,02	+0,56	−0,56	−0,80	+0,29	+1,33	+1,02	−0,08	−0,56	−0,08	+0,65	+1,62	+3,48	+5,79	+5,64
+10	+3,19	−3,85	−7,08	−7,27	−4,82	−2,27	−1,18	−0,68	+0,06	+0,79	+0,43	−0,52	−0,52	+0,52	+1,59	+1,05	+0,10	−0,19	+0,14	+0,60	+1,26	+3,45	+6,58	+7,11
0	+4,81	−1,81	−6,85	−7,61	−4,97	−2,17	−1,03	−0,64	0,00	+0,69	+0,53	−0,03	+0,03	+0,77	+1,14	+0,61	−0,29	−0,93	−0,11	+0,18	+0,99	+3,61	+7,35	+8,53
−10	+6,96	+0,05	−5,57	−2,04	−4,74	−1,83	−0,79	−0,68	−0,13	+0,50	+0,61	+0,43	+0,58	+0,89	+0,70	−0,31	−1,13	−1,13	−0,68	−0,26	+0,79	+3,72	+7,82	+9,58
−20	+7,64	+2,15	−3,35	−5,84	−4,21	−1,58	−0,58	−0,46	−0,16	+0,46	+0,68	+0,71	+0,94	+1,04	+0,32	−1,09	−2,09	−2,00	−1,31	−0,56	+0,55	+1,72	+2,57	+2,48
−30	+7,98	+3,62	−1,02	−1,79	−3,31	−1,38	−0,44	−0,29	+0,02	+0,52	+0,75	+0,90	+1,10	+0,84	−0,19	−1,77	−2,72	−2,43	−1,48	−0,36	+1,00	+3,41	+6,60	+8,45
−40	+5,71	+3,31	+0,24	−2,19	−2,53	−1,60	−0,68	−0,34	+0,13	+0,63	+1,04	+1,14	+1,18	+0,63	−0,53	−1,96	−2,75	−2,29	−1,03	+0,18	+1,41	+3,83	+5,37	+6,30
−50	+3,22	+1,68	−0,17	−1,91	−2,64	−2,29	−1,68	−1,05	−0,15	+0,68	+1,23	+1,38	+1,38	+0,87	−0,19	−1,36	−1,83	−1,19	+0,15	+1,29	+2,00	+2,64	+3,25	+3,68
−60	+0,95	−0,17	−1,36	−2,91	−3,21	−3,63	−3,87	−3,84	−3,14	+0,37	+2,75	+3,02	+2,75	+2,03	+1,10	+0,40	+0,37	+1,04	+1,38	+2,39	+2,94	+2,32	+2,02	+1,74
−70	−0,45	−1,23	−2,14	−3,07	−3,85	−4,86	−5,97	−7,74	−12,45	−27,58	+24,23	+13,13	+8,61	+6,37	+4,94	+3,90	+3,45	+3,17	+2,90	+2,58	+2,20	+1,71	+1,09	+0,37
−80	−1,28	−1,91	−2,58	−3,22	−3,90	−4,67	−5,47	−6,25	−6,82	−6,56	−4,08	+0,74	+4,14	+5,00	+4,72	+3,85	+3,16	+2,46	+1,93	+1,45	+0,93	+0,50	−0,10	−0,64

TABLE (46) Secular changes Δδ in minutes between 1842 and 1885 when the time is increased by one year. For $\varphi = +90°$, $\Delta\delta = +3'98$; for $\varphi = -90°$, $\Delta\delta = -5'88$.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	−4,26	−5,23	−5,65	−6,05	−6,42	−6,37	−5,91	−4,14	−1,02	+1,88	+3,93	+4,51	+4,05	+3,07	+1,70	+0,14	−0,79	+0,93	+0,16	+0,30	−0,86	−1,38	−2,47	−3,18
+70	−5,07	−5,56	−6,16	−6,26	−6,21	−5,53	−3,91	−0,33	+3,84	+5,31	+5,67	+4,44	+3,14	+1,60	0,00	−1,84	−4,67	−14,67	+18,00	+3,97	+0,51	−4,56	−3,18	−4,91
+60	−6,30	−6,60	−6,19	−5,49	−4,81	−3,79	−1,84	+1,12	+3,88	+4,81	+4,51	+3,40	+2,16	+0,91	−0,49	−1,84	−3,16	−3,33	+3,49	+6,72	+2,58	−0,77	−3,37	−5,35
+50	−6,36	−6,63	−5,86	−4,70	−3,58	−2,30	−1,00	+0,74	+2,46	+3,60	+3,81	+3,02	+1,77	+0,51	−0,47	−1,58	−2,05	−1,58	+1,37	+5,21	+4,74	+1,59	−2,00	−4,79
+40	−5,40	−6,12	−5,60	−4,23	−2,84	−1,67	−0,78	+0,33	+1,53	+2,93	+3,16	+2,60	+1,42	+0,23	−0,51	−1,02	−1,16	−0,63	+1,26	+4,14	+5,49	+3,63	+0,16	−3,28
+30	−4,19	−5,37	−5,14	−4,02	−2,51	−1,28	−0,56	+0,09	+0,95	+2,12	+2,84	+2,56	+1,67	+0,37	−0,58	−1,00	−1,05	−0,44	+0,95	+3,03	+4,95	+4,65	+1,73	−1,53
+20	−3,00	−4,79	−5,00	−3,98	−2,11	−0,95	−0,26	−0,14	+0,33	+1,37	+2,41	+2,76	+2,00	+0,65	−0,53	−1,09	−1,07	−0,58	+0,60	+2,51	+4,37	+4,93	+3,12	−0,14
+10	−1,70	−4,14	−4,73	−3,86	−2,05	−0,60	−0,07	−0,33	−0,21	+0,58	+1,90	+2,63	+2,07	+0,72	−0,67	−1,37	−1,37	−0,95	+0,03	+1,86	+3,74	+5,07	+4,21	+1,44
0	−0,51	−3,28	−4,58	−3,58	−1,63	−0,09	+0,21	−0,42	−0,70	+0,02	+1,35	+2,14	+1,74	+0,53	−0,72	−1,60	−1,86	−1,58	−0,67	+0,93	+3,19	+5,07	+5,05	+2,77
−10	+1,09	−2,46	−4,21	−3,60	−1,53	+0,23	+0,44	−0,39	−1,05	−0,70	+0,49	+1,23	+1,02	+0,19	−0,93	−1,67	−2,14	−2,33	−1,86	−0,28	+2,43	+5,60	+6,60	+4,70
−20	+3,16	−0,95	−3,30	−3,12	−1,28	+0,28	+0,49	−0,30	−1,00	−1,05	−0,40	+0,12	−0,05	−0,67	−1,33	−2,02	−2,81	−3,53	−3,35	−1,60	+1,98	+4,35	+6,49	+6,73
−30	+5,95	+1,46	−1,75	−2,46	−1,09	+0,58	+1,05	+0,92	−0,60	−1,21	−1,17	−1,02	−1,14	−1,30	−1,70	−2,35	−3,54	−4,79	−4,77	−2,79	+1,56	+6,80	+10,03	+9,49
−40	+8,13	+4,30	+0,81	−0,84	−0,44	+1,16	+2,32	+2,13	+0,91	−0,72	−1,70	−1,84	−1,77	−1,67	−2,00	−2,93	−4,46	−5,56	−5,05	−2,44	+2,05	+7,04	+10,56	+10,81
−50	+8,37	+5,72	+2,53	+0,51	+0,46	+1,72	+3,49	+4,72	+4,14	+1,56	−0,40	−1,05	−1,19	−1,51	−2,33	−3,67	−5,19	−5,56	−4,16	−1,14	+2,94	+6,93	+9,66	+10,53
−60	+7,51	+5,19	+2,49	+0,42	−0,42	+0,12	+1,79	+4,35	+7,93	+8,95	+4,35	+1,74	+0,30	−1,02	−2,70	−4,35	−5,12	−4,30	−2,07	+0,79	+3,86	+6,49	+8,30	+8,58
−70	+5,02	+3,26	+1,26	−0,70	−2,16	−3,00	−3,16	−3,44	−2,09	+0,56	+3,11	+3,60	+2,58	−0,93	−3,28	−4,07	−3,92	−1,51	+0,70	+2,86	+4,56	+5,79	+6,30	+6,05
−80	+2,21	+1,28	−0,19	−1,40	−2,34	−4,46	−5,91	−7,88	−10,02	−13,73	−15,16	−13,21	−8,05	−4,81	−2,98	−1,51	−0,40	+0,95	+2,08	+2,84	+3,33	+3,53	+3,42	+3,00

Secular changes Δδ of declination δ

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TABLE (47) Secular changes Δi in minutes between 1550-1600 when time is increased by one year. For $\varphi = +90°$, $\Delta i = +0'.42$; for $\varphi = -90°$, $\Delta i = -0'.08$.

φ	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+0.02	-0.18	-0.32	-0.36	-0.30	+0.06	+0.42	+0.76	+0.96	+1.08	+1.14	+1.16	+1.14	+1.08	+0.96	+0.94	+0.94	+0.94	+0.94	+0.28	+0.30	+0.32	+0.28	+0.16
+70	+0.40	-0.10	-0.74	-1.20	-1.12	-0.62	0.00	+0.56	+1.00	+1.28	+1.32	+1.30	+0.94	+0.62	+0.26	-0.22	-0.72	-0.58	-0.02	+0.40	+0.68	+0.84	+0.82	+0.68
+60	+1.02	+0.34	-0.72	-1.76	-2.04	-1.58	-0.80	+0.08	+0.76	+1.12	+1.24	+1.10	+0.82	+0.44	+0.16	-0.14	-0.38	-0.42	-0.06	+0.54	+1.06	+1.44	+1.54	+1.42
+50	+1.74	+0.88	-0.54	-2.18	-2.78	-2.48	-1.64	-0.62	+0.28	+0.82	+1.08	+1.08	+0.78	+0.46	+0.22	+0.10	-0.02	-0.20	-0.06	+0.56	+1.36	+2.04	+2.24	+2.14
+40	+2.44	+1.32	-0.40	-2.44	-3.54	-3.16	-2.46	-1.26	-0.34	+0.44	+1.02	+1.18	+0.88	+0.26	0.00	+0.14	+0.12	-0.04	-0.12	+0.44	+1.52	+2.56	+2.98	+2.96
+30	+3.08	+1.78	-0.46	-2.98	-4.50	-4.36	-3.16	-1.88	-0.98	-0.52	+1.02	+1.56	+0.94	-0.12	-0.56	-0.12	+0.36	+0.12	-0.14	+0.32	+1.70	+3.16	+3.76	+3.70
+20	+3.82	+2.08	-0.74	-3.86	-5.58	-5.26	-3.90	-1.90	-.28	-0.34	+1.28	+1.94	+1.18	-0.70	-1.42	-0.54	+0.54	+0.90	-0.34	-0.04	+1.74	+3.30	+4.96	+4.72
+10	+4.28	+2.06	-1.48	-5.14	-6.94	-5.74	-3.06	-1.52	-1.36	-0.70	+1.44	+2.66	+1.36	-1.10	-2.26	-1.04	+0.70	+0.66	-0.58	-0.48	+1.78	+4.68	+6.00	+5.58
0	+4.46	+1.90	-2.10	-6.06	-7.54	-5.96	-2.14	-0.70	-1.08	-0.82	+1.24	+2.80	+1.58	-1.08	-2.98	-1.08	+0.94	+0.84	-0.82	-0.96	+1.66	+5.12	+6.84	+6.22
-10	+4.10	+1.40	-2.56	-6.26	-7.16	-4.68	-1.44	-0.14	-0.76	-0.76	+0.82	+1.98	+1.50	-0.66	-1.64	-0.58	+1.12	+0.74	-1.02	-1.22	+1.38	+4.84	+6.68	+5.96
-20	+3.14	+0.82	-2.68	-5.46	-6.14	-4.08	-1.36	-0.26	-0.70	-0.24	+0.28	+1.54	+1.32	+0.14	-0.42	+0.30	+1.14	+0.92	-1.08	-1.04	+1.82	+4.16	+5.58	+4.94
-30	+2.22	+0.30	-2.06	-4.32	-5.02	-3.78	-1.82	-0.68	-0.86	-1.02	-0.30	+0.82	+1.20	+0.92	+0.72	+1.00	+1.04	+0.84	-1.02	-0.72	+1.34	+3.60	+4.98	+3.76
-40	+1.64	0.00	-1.82	-3.48	-4.22	-3.46	-2.40	-1.44	-1.28	-1.22	-0.56	+0.38	+1.08	+1.30	+1.32	+1.22	+0.72	-0.20	-0.88	-0.14	+1.98	+3.24	+3.70	+3.00
-50	+1.26	-0.16	-1.60	-2.84	-3.48	-3.32	-2.70	-2.04	-1.68	-1.40	-0.80	+0.08	+0.88	+1.30	+1.38	+1.08	+0.46	-0.24	-0.50	+0.26	+1.76	+2.98	+3.18	+2.40
-60	+0.88	-0.28	-1.26	-2.08	-2.70	-2.72	-2.52	-2.24	-1.88	-1.58	-0.88	+0.02	+0.64	+1.10	+1.06	+0.68	+0.26	-0.18	-0.02	+0.70	+1.98	+2.62	+2.50	+1.76
-70	+0.60	-0.16	-0.82	-1.36	-1.76	-1.98	-2.02	-1.98	-1.86	-1.62	-1.06	-0.36	+0.24	+0.60	+0.62	+0.48	+0.30	+0.28	+0.62	+1.28	+1.86	+2.06	+1.82	+1.30
-80	+0.30	-0.10	-0.42	-0.72	-0.92	-1.08	-1.22	-1.30	-1.34	-1.36	-1.34	-1.26	-1.08	0.00	+0.70	+0.86	+0.92	+1.02	+1.18	+1.28	+1.30	+1.12	+0.92	+0.64

TABLE (47) Secular changes Δi in minutes between 1600-1650 when time is increased by one year. For $\varphi = +90°$, $\Delta i = +0'.12$; for $\varphi = -90°$, $\Delta i = +0'.38$.

φ	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-0.40	-0.70	-0.94	-0.96	-0.80	-0.52	0.00	+0.40	+0.68	+0.86	+0.92	+0.86	+0.66	+0.48	+0.30	+0.16	+0.04	+0.02	+0.04	+0.06	+0.14	+0.18	-0.06	
+70	-0.16	-0.84	-1.38	-1.98	-1.86	-1.28	-0.48	+0.28	+0.80	+0.98	+0.88	+0.68	+0.32	+0.02	-0.28	-0.52	-0.52	-0.32	+0.28	+0.70	+1.00	+1.18	+1.12	+0.86	+0.42
+60	+0.42	-0.60	-1.86	-2.72	-2.76	-2.14	-1.08	-0.06	+0.64	+0.86	+0.90	+0.80	+0.64	+0.16	-0.24	-0.08	+0.16	+0.52	+1.04	+1.54	+1.92	+1.90	+1.64	+1.14	
+50	+1.00	-0.20	-1.80	-3.10	-3.60	-2.98	-1.76	-0.52	+0.36	+0.94	+0.98	+0.84	+0.30	-0.48	-0.22	+0.26	+0.68	+0.94	+1.24	+1.78	+2.38	+2.56	+2.40	+1.82	
+40	+1.42	+0.16	-1.70	-3.54	-4.36	-3.80	-2.28	-1.00	-0.24	+0.04	+0.06	-0.14	-0.64	-1.00	-0.64	+0.32	+1.16	+1.38	+1.48	+1.96	+2.78	+3.24	+3.02	+2.30	
+30	+1.72	+0.28	-1.90	-4.24	-5.26	-4.52	-2.54	-0.98	-0.58	-0.32	-0.20	-0.18	-0.86	-1.72	-1.42	+0.30	+1.64	+2.04	+1.82	+2.10	+3.06	+3.88	+3.70	+2.68	
+20	+1.74	+0.04	-2.46	-5.20	-6.42	-5.02	-2.18	-0.48	-0.70	-0.54	-0.24	+0.02	-1.22	-2.92	-2.88	-0.96	+2.18	+2.96	+2.32	+2.36	+3.56	+4.72	+4.48	+3.46	
+10	+1.62	-0.50	-3.08	-6.56	-7.38	-5.78	-2.58	+0.62	-0.54	-1.28	-0.26	+0.38	-1.34	-4.06	-4.42	-1.20	+2.74	+3.84	+2.68	+2.28	+3.90	+5.64	+5.54	+3.66	
0	+1.32	-1.24	-3.60	-6.58	-7.66	-5.98	+0.22	+1.52	-0.12	-1.28	-0.40	+0.28	-1.52	-4.54	-5.10	-1.46	+3.02	+4.22	+2.60	+1.92	+3.86	+6.32	+6.44	+4.06	
-10	+0.78	-1.88	-4.32	-6.34	-6.76	-5.04	+0.86	+1.90	+2.26	-1.14	-0.44	0.00	-1.36	-3.68	-4.04	-0.82	+2.86	+3.58	+1.88	+1.28	+3.26	+5.98	+6.32	+3.96	
-20	+0.20	-2.12	-4.32	-6.08	-5.52	-2.52	+0.72	+1.70	+0.28	-1.06	-0.30	-0.36	-0.82	-2.06	-2.02	+0.28	+2.46	+2.48	+0.98	+0.62	+2.63	+3.14	+5.38	+3.20	
-30	+0.28	-1.82	-3.48	-4.64	-4.40	-2.44	0.00	+0.32	+0.08	-0.96	-0.92	-0.40	-0.26	-0.46	-0.10	+1.08	+1.96	+1.90	+0.22	+0.38	+2.26	+3.50	+4.50	+2.68	
-40	+0.36	-1.32	-2.80	-3.78	-3.78	-2.64	-0.94	-0.10	-0.44	-1.14	-1.12	-0.86	+0.02	+0.40	+0.88	+1.36	+1.32	+0.56	-0.10	+0.56	+2.38	+3.84	+3.84	+2.28	
-50	+0.58	-0.88	-2.08	-2.90	-3.04	-2.44	-1.46	-0.82	-0.84	-1.20	-1.14	-0.54	+0.20	+0.76	+1.10	+1.10	+0.66	+0.06	0.00	+0.92	+2.48	+3.46	+3.32	+2.14	
-60	+0.72	-0.30	-1.34	-2.04	-2.26	-2.20	-1.76	-1.28	-1.18	-1.12	-0.96	-0.48	+0.16	+0.54	+0.78	+0.64	+0.20	0.00	+0.28	+1.22	+2.36	+2.84	+2.66	+1.86	
-70	+0.72	0.00	-0.70	-1.22	-1.48	-1.54	-1.44	-1.28	-1.16	-1.10	-0.92	-0.64	-0.04	+0.22	+0.28	+0.26	+0.16	+0.32	+0.84	+1.52	+2.06	+2.22	+1.98	+1.46	
-80	+0.60	+0.26	-0.06	-0.30	-0.50	-0.64	-0.72	-0.76	-0.78	-0.74	-0.74	-0.78	-0.64	+0.30	+0.56	+0.78	+0.88	+1.04	+1.24	+1.34	+1.44	+1.38	+1.22	+0.94	

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Secular changes Δi of inclination i

TABLE (47). Secular changes Δi in minutes between 1650-1700 when time is increased by one year. For $\varphi = +90°$, $\Delta i = -1,'08$; for $\varphi = -90°$, $\Delta i = +1,'02$.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-0,'72	-0,'84	-0,'92	-0,'92	-0,'86	-0,'78	-0,'76	-0,'80	-0,'84	-0,'96	-1,'04	-1,'16	-1,'22	-1,'26	-1,'28	-1,'36	-1,'50	-0,'78	-0,'06	0,'00	-0,'14	-0,'24	-0,'42	-0,'58
+70	-0,'38	-1,'30	-1,'50	-1,'36	-0,'92	-0,'44	-0,'14	-0,'10	-0,'26	-0,'52	-0,'76	-1,'00	-1,'08	-1,'04	-0,'78	-0,'22	+0,'34	+1,'94	+1,'58	+1,'02	+0,'52	+0,'18	-0,'12	-0,'44
+60	-1,'06	-1,'96	-2,'48	-2,'30	-1,'36	-0,'22	+0,'50	+0,'68	+0,'40	0,'00	-0,'44	-0,'94	-1,'30	-1,'42	-1,'02	-0,'24	+0,'76	+1,'72	+2,'06	+1,'78	+1,'20	+0,'72	+0,'24	-0,'11
+50	-0,'84	-2,'50	-3,'76	-3,'66	-2,'16	-0,'20	+1,'12	+1,'46	+1,'14	+0,'42	0,'00	-0,'88	-1,'68	-2,'00	-1,'54	-0,'54	+0,'56	+1,'78	+2,'38	+2,'44	+2,'32	+1,'72	+1,'00	+0,'28
+40	-0,'38	-2,'94	-5,'32	-5,'74	-3,'64	-0,'82	+1,'48	+2,'16	+1,'86	+1,'40	+0,'70	-0,'74	-2,'30	-3,'00	-2,'32	-0,'92	+0,'40	+1,'60	+2,'72	+3,'52	+3,'52	+2,'82	+1,'98	+1,'12
+30	+0,'24	-3,'26	-7,'08	-8,'34	-5,'84	-1,'36	+1,'88	+2,'64	+2,'34	+2,'22	+1,'44	-0,'72	-3,'28	-4,'32	-3,'20	-1,'24	+0,'46	+1,'82	+3,'34	+4,'25	+5,'18	+4,'24	+3,'04	+2,'10
+20	+1,'04	-3,'48	-9,'10	-11,'52	-8,'54	-2,'44	+1,'90	+2,'76	+2,'54	+2,'76	+2,'04	-0,'84	-4,'18	-5,'32	-3,'66	-1,'06	+0,'78	+2,'32	+4,'44	+4,'66	+4,'28	+3,'90	+4,'14	+2,'96
+10	+1,'74	-3,'86	-11,'08	-14,'64	-11,'08	-3,'74	+1,'38	+2,'52	+2,'16	+2,'64	+2,'01	-1,'28	-4,'98	-5,'88	-3,'64	-0,'46	+1,'56	+3,'12	+5,'40	+8,'24	+9,'90	+7,'94	+5,'34	+3,'90
0	+2,'00	-4,'20	-12,'22	-15,'74	-11,'78	-4,'44	+0,'46	+1,'38	+1,'32	+1,'74	+1,'58	-1,'44	-4,'30	-5,'44	-3,'92	+0,'30	+2,'20	+3,'68	+6,'78	+10,'14	+11,'62	+7,'38	+6,'22	+4,'90
-10	+1,'70	-4,'18	-11,'38	-14,'16	-10,'34	-4,'44	-0,'30	+0,'52	+0,'42	+0,'86	+0,'74	-1,'14	-3,'42	-3,'74	-1,'60	+0,'88	+2,'38	+3,'70	+6,'56	+9,'94	+11,'28	+9,'38	+6,'24	+4,'16
-20	+0,'94	-3,'90	-9,'28	-11,'18	-8,'60	-4,'12	-0,'96	-0,'28	-0,'32	+0,'04	+0,'16	-0,'66	-1,'80	-1,'74	-0,'34	+1,'24	+2,'20	+3,'34	+5,'70	+8,'28	+9,'24	+7,'86	+5,'32	+3,'16
-30	+0,'18	-3,'22	-6,'82	-8,'18	-6,'58	-3,'58	-1,'36	-0,'82	-0,'90	-0,'66	-0,'32	-0,'38	-0,'60	-0,'48	+0,'40	+1,'20	+1,'78	+2,'80	+4,'66	+6,'60	+7,'18	+6,'00	+4,'12	+2,'34
-40	-0,'18	-2,'48	-4,'60	-5,'56	-4,'80	-3,'02	-1,'64	-1,'22	-1,'36	-1,'14	-0,'66	-0,'22	+0,'16	+0,'44	+0,'76	+1,'02	+1,'38	+2,'24	+3,'80	+5,'12	+5,'40	+4,'46	+3,'04	+1,'58
-50	-0,'01	-1,'58	-2,'98	-3,'54	-3,'34	-2,'64	-1,'96	-1,'76	-1,'90	-1,'60	-0,'96	-0,'16	+0,'34	+0,'64	+0,'76	+0,'82	+1,'20	+2,'00	+3,'14	+4,'06	+4,'12	+3,'44	+2,'38	+1,'24
-60	-0,'28	-0,'66	-1,'46	-2,'00	-2,'10	-1,'96	-1,'86	-1,'98	-2,'22	-2,'12	-1,'78	-0,'38	+0,'24	+0,'52	+0,'68	+0,'86	+1,'20	+1,'92	+2,'76	+3,'32	+3,'30	+2,'84	+2,'10	+1,'24
-70	+0,'58	0,'00	-0,'46	-0,'80	-1,'12	-1,'18	-1,'36	-1,'66	-2,'12	-2,'52	-1,'86	-0,'66	+0,'16	+0,'58	+0,'88	+1,'12	+1,'56	+2,'12	+2,'58	+2,'76	+2,'58	+2,'18	+1,'70	+1,'18
-80	+0,'84	+0,'56	+0,'28	+0,'04	-0,'20	-0,'36	-0,'52	-0,'64	-0,'74	-0,'80	-0,'70	+0,'24	+2,'00	+2,'10	+2,'16	+2,'28	+2,'16	+2,'38	+2,'30	+2,'18	+2,'03	+1,'74	+1,'42	+1,'14

TABLE (47) Secular changes Δi in minutes between 1700-1780 when time is increased by one year. For $\varphi = +90°$, $\Delta i = -1,'11$; for $\varphi = -90°$, $\Delta i = +3,'14$.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-1,'96	-2,'01	-1,'91	-1,'66	-1,'26	-0,'71	-0,'10	+0,'46	+0,'88	+1,'10	+1,'12	+1,'03	+0,'86	+0,'65	+0,'39	0,'00	-0,'69	-1,'16	-1,'70	-1,'96	-1,'96	-1,'79	-1,'72	-1,'85
+70	-1,'69	-2,'05	-2,'11	-1,'81	-1,'16	-0,'24	+0,'66	+1,'35	+1,'60	+1,'41	+0,'94	+0,'39	-0,'02	-0,'26	-0,'28	-0,'15	+0,'24	+1,'18	+0,'43	+0,'07	-0,'16	-0,'46	-0,'81	-1,'26
+60	-1,'05	-1,'78	-2,'10	-1,'84	-1,'14	-0,'10	+0,'84	+1,'43	+1,'44	+0,'90	+0,'03	-0,'76	-1,'36	-1,'52	-1,'30	-0,'60	+0,'14	+1,'14	+1,'86	+1,'84	+1,'59	+1,'14	+0,'54	-0,'22
+50	-0,'71	-1,'74	-2,'30	-2,'15	-1,'37	-0,'27	+0,'75	+1,'27	+1,'12	+0,'35	-0,'79	-1,'95	-2,'48	-2,'72	-2,'06	-1,'01	+0,'07	+1,'03	+1,'85	+2,'46	+2,'68	+2,'40	+1,'63	+0,'53
+40	-0,'66	-2,'02	-2,'90	-2,'86	-1,'85	-0,'42	+0,'80	+1,'31	+1,'91	-0,'04	-1,'51	-3,'00	-3,'84	-3,'64	-2,'51	-1,'04	+0,'16	+1,'07	+1,'83	+2,'70	+3,'20	+3,'04	+2,'18	+0,'89
+30	-0,'86	-2,'16	-3,'11	-3,'16	-2,'26	-0,'65	+1,'03	+1,'65	+1,'18	-0,'16	-2,'02	-3,'84	-4,'66	-4,'11	-2,'60	-0,'90	+0,'36	+1,'23	+2,'21	+3,'11	+3,'68	+3,'43	+2,'41	+0,'96
+20	-0,'98	-3,'18	-5,'17	-6,'05	-4,'01	-0,'88	+1,'48	+2,'24	+1,'59	-0,'01	-2,'18	-4,'26	-5,'08	-4,'25	-2,'44	-0,'58	+0,'74	+1,'70	+2,'87	+3,'99	+4,'54	+4,'05	+2,'83	+1,'20
+10	-0,'77	-2,'50	-3,'59	-3,'74	-2,'91	-1,'05	+1,'73	+2,'68	+2,'10	+0,'47	-1,'35	-3,'24	-3,'97	-3,'81	-1,'70	-0,'02	+1,'00	+2,'15	+3,'86	+5,'47	+5,'91	+5,'65	+3,'62	+1,'91
0	-0,'36	-1,'93	-2,'45	-2,'30	-1,'56	-0,'11	+1,'61	+2,'56	+1,'87	+0,'88	-1,'31	-3,'47	-4,'14	-3,'74	-2,'04	+0,'62	+1,'12	+2,'32	+3,'65	+4,'91	+5,'37	+4,'51	+2,'82	+1,'87
-10	+0,'12	-1,'69	-2,'93	-2,'63	-1,'70	-1,'30	+0,'95	+1,'86	+1,'85	+1,'07	-0,'58	-2,'31	-2,'72	-2,'33	+0,'43	+1,'09	+0,'96	+1,'93	+2,'49	+3,'20	+3,'31	+2,'59	+1,'85	+1,'70
-20	+0,'35	-1,'79	-2,'96	-3,'34	-2,'18	-1,'63	+0,'09	+0,'94	+1,'27	+1,'01	-0,'01	-1,'14	-1,'22	-0,'12	+1,'05	+1,'10	+0,'61	+1,'29	+2,'64	+3,'29	+3,'72	+2,'55	+1,'35	+0,'80
-30	+0,'11	-1,'02	-2,'01	-2,'06	-1,'74	-2,'04	-0,'82	-0,'08	+0,'58	+0,'75	+0,'30	-0,'26	-0,'21	+0,'51	+1,'03	+0,'75	+0,'21	+0,'75	+1,'83	+2,'16	+2,'55	+2,'39	+1,'15	+0,'01
-40	-0,'09	-0,'32	-1,'46	-1,'80	-1,'10	-2,'23	-1,'55	-0,'94	-0,'21	+0,'30	+0,'35	+0,'16	+0,'12	+0,'54	+0,'61	+0,'25	-0,'06	+0,'58	+1,'34	+1,'33	+1,'49	+1,'42	+0,'25	-0,'38
-50	+0,'27	-0,'24	-1,'12	-1,'36	-1,'18	-1,'89	-1,'72	-1,'46	-0,'91	-0,'34	+0,'06	+0,'07	+0,'09	+0,'12	+0,'02	-0,'15	-0,'06	+0,'79	+1,'40	+1,'02	+0,'89	+0,'74	+0,'31	+0,'08
-60	+1,'10	+0,'89	+0,'56	-0,'30	-0,'94	-1,'03	-1,'20	-1,'37	-1,'43	-1,'09	-0,'65	-0,'43	-0,'36	-0,'35	-0,'36	-0,'21	+0,'36	+1,'44	+2,'83	+3,'96	+4,'49	+4,'27	+3,'50	+2,'34
-70	+2,'15	+1,'52	+1,'07	+0,'69	+0,'49	+0,'21	-0,'04	-0,'26	-0,'61	-1,'31	-1,'39	-0,'74	-0,'49	-0,'1		+0,'65	+1,'50	+2,'47	+3,'41	+4,'01	+4,'22	+4,'03	+3,'52	+2,'46
-80	+2,'87	+2,'56	+2,'27	+2,'05	+1,'86	+1,'72	+1,'66	+1,'66	+1,'74	+2,'00	+2,'44	+2,'74	+2,'56	+2,'4		+2,'87	+3,'17	+3,'43	+3,'73	+3,'86	+3,'81	+3,'68	+3,'47	+3,'17

Secular charges Δi of inclination i

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TABLE (47) Secular changes Δi in minutes between 1780-1842 when time is increased by one year. For $\varphi = +90°$, $\Delta i = 0'.00$; for $\varphi = -90°$, $\Delta i = -0'.64$.

φ	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-0,27	-0,40	-0,50	-0,53	-0,53	-0,52	-0,50	-0,45	-0,38	-0,31	-0,24	-0,19	-0,16	-0,16	-0,18	-0,22	-0,28	-0,34	+0,39	+0,39	+0,35	+0,30	+0,26	+0,08
+70	-1,07	-1,10	-1,07	-0,92	-0,68	-0,40	-0,14	+0,06	+0,18	+0,14	+0,01	-0,13	-0,31	-0,34	-0,29	-0,25	-0,15	-0,13	+1,10	+1,26	+0,74	+0,16	-0,40	-0,80
+60	-2,05	-1,98	-1,53	-0,92	-0,26	+0,31	+0,79	+1,10	+1,16	+1,07	+0,77	+0,58	+0,29	-0,13	-0,63	-1,03	-1,21	-0,71	+0,50	+0,39	+0,05	-0,31	-1,05	-1,70
+50	-3,05	-2,85	-1,98	-0,58	+0,63	+1,50	+2,03	+2,30	+2,25	+1,96	+1,68	+1,55	+1,43	+1,13	+0,48	-0,14	-0,40	-0,13	+0,45	+0,66	+0,16	-0,66	-1,65	-2,54
+40	-4,61	-4,50	-2,87	-0,97	+1,55	+2,67	+3,21	+3,43	+3,34	+2,92	+2,42	+2,57	+2,88	+2,82	+2,01	+1,03	+0,53	+0,56	+0,72	+0,61	+0,11	-0,71	-1,93	-3,43
+30	-6,82	-7,03	-4,58	-0,77	+2,40	+3,77	+4,31	+4,55	+4,43	+3,54	+3,11	+3,43	+4,23	+4,45	+3,56	+2,24	+1,39	+1,21	+1,05	+0,74	+0,27	-0,42	-1,80	-4,48
+20	-10,02	-10,89	-7,25	-1,48	+2,80	+4,53	+4,94	+5,24	+5,29	+4,61	+3,67	+3,95	+5,10	+5,61	+4,74	+3,17	+2,15	+1,83	+1,55	+1,14	+0,79	+0,21	-1,90	-5,94
+10	-13,68	-15,18	-10,05	-2,54	+2,52	+4,45	+4,77	+5,11	+5,30	+4,61	+3,24	+3,74	+5,05	+5,59	+4,72	+3,34	+2,61	+2,38	+2,08	+1,78	+1,74	+1,33	-1,53	-7,52
0	-16,12	-17,63	-11,63	-3,53	+1,71	+3,41	+3,61	+3,99	+4,26	+3,74	+3,03	+3,22	+4,69	+5,38	+3,61	+2,68	+2,58	+2,83	+2,83	+2,85	+3,24	+2,56	-0,79	-8,39
-10	-15,45	-16,64	-11,84	-3,90	+0,71	+2,14	+2,24	+2,48	+2,82	+2,61	+2,15	+2,19	+2,59	+2,53	+1,86	+1,17	+2,20	+3,12	+3,66	+4,14	+5,13	+4,99	+4,84	-2,61
-20	-14,53	-12,79	-8,92	-3,55	+0,06	+1,28	+1,31	+1,40	+1,58	+1,45	+1,26	+1,24	+1,23	+0,89	+0,42	+0,56	+1,71	+2,16	+2,91	+3,29	+4,27	+4,41	+2,57	-4,89
-30	-6,39	-7,87	-5,89	-2,59	-0,19	+0,77	+0,77	+0,71	+0,68	+0,71	+0,60	+0,48	+0,24	-0,16	-0,35	+0,16	+1,50	+2,11	+2,33	+3,58	+4,66	+4,80	+4,00	-1,30
-40	-1,90	-3,29	-2,70	-1,18	+0,14	+0,66	+0,64	+0,52	+0,43	+0,35	+0,13	+0,06	-0,18	-0,45	-0,42	+0,18	+1,44	+2,88	+2,06	+3,08	+3,29	+3,93	+3,32	+1,15
-50	+0,56	-0,41	-0,52	-0,06	+0,48	+0,56	+0,58	+0,52	+0,45	+0,37	+0,23	+0,08	-0,08	-0,21	-0,10	+0,42	+1,28	+2,35	+3,19	+3,85	+4,35	+4,33	+3,14	+2,19
-60	+1,16	+0,47	+0,31	+0,21	+0,27	+0,34	+0,37	+0,47	+0,58	+0,61	+0,48	+0,31	+0,16	+0,10	+0,18	+0,52	+1,02	+1,56	+1,59	+2,33	+2,53	+2,62	+2,36	+1,85
-70	+0,53	+0,32	+0,08	0,00	-0,08	-0,13	-0,11	-0,11	+0,03	+0,42	+0,63	+0,26	+0,10	+0,03	+0,05	+0,13	+0,29	+0,50	+0,66	+0,84	+0,93	+0,97	+0,92	+0,72
-80	-0,35	-0,39	-0,47	-0,55	-0,58	-0,64	-0,72	-0,78	-0,82	-1,00	-1,10	-1,13	-1,07	-0,93	-0,85	-0,76	-0,64	-0,55	-0,45	-0,40	-0,31	-0,26	-0,16	-0,23

TABLE (47) Secular changes Δi in minutes between 1842-1885 when time is increased by one year. For $\varphi = +90°$, $\Delta i = +1'.70$; for $\varphi = -90°$, $\Delta i = +1'.05$.

φ	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+0,92	+0,88	+0,70	+0,86	+1,00	+1,14	+1,24	+1,33	+1,28	+1,19	+0,98	+0,79	+0,56	+0,42	+0,26	+0,09	-0,02	-0,21	-0,09	-0,07	0,00	+0,05	+0,19	+0,28
+70	+0,19	+0,56	+0,90	+1,19	+1,42	+1,66	+1,89	+2,00	+1,77	+1,37	+0,95	+0,63	+0,40	+0,21	+0,14	+0,07	+0,07	+0,14	-0,19	-0,28	-0,17	-0,40	-0,33	-0,14
+60	-0,49	+0,16	+0,86	+1,42	+1,98	+2,12	+2,33	+2,30	+2,00	+1,49	+1,05	+0,60	+0,33	+0,16	+0,14	+0,21	+0,38	+0,49	+0,53	-0,19	-0,81	-1,14	-1,23	-1,05
+50	-1,68	-0,70	+0,48	+1,53	+1,91	+2,14	+2,38	+2,38	+2,12	+1,68	+1,05	+0,53	+0,23	+0,19	+0,28	+0,35	+0,47	+0,61	+0,70	+0,07	-0,98	-2,00	-2,40	-2,38
+40	-3,12	-1,85	-0,19	+1,16	+2,00	+2,35	+2,55	+2,55	+2,40	+2,00	+1,23	+0,70	-0,14	-0,28	0,00	+0,30	+0,63	+0,88	+0,93	+0,35	-0,86	-2,34	-3,35	-3,67
+30	-4,93	-3,52	-1,07	+1,05	+2,10	+2,62	+2,56	+2,62	+2,82	+2,61	+1,82	+0,99	-0,58	-0,93	-0,65	-0,02	+0,60	+1,02	+1,16	+0,72	-0,56	-2,15	-3,02	-5,07
+20	-7,15	-5,42	-2,24	+0,84	+2,61	+2,89	+2,62	+2,62	+3,05	+2,91	+2,28	+0,37	-1,42	-2,20	-1,86	-0,90	+0,14	+0,90	+1,30	+0,98	-0,28	-2,35	-4,75	-6,66
+10	-9,25	-7,04	-3,17	+0,53	+2,48	+2,65	+2,14	+2,07	+2,72	+2,32	+2,93	+0,28	-2,17	-3,25	-3,31	-2,44	-0,76	+0,56	+1,30	+1,37	+0,76	-2,10	-3,21	-3,17
0	-10,40	-7,78	-3,59	+0,02	+1,85	+1,82	+0,55	+0,67	+1,42	+2,31	+1,95	-0,23	-2,70	-4,26	-4,30	-3,25	-1,83	-0,26	+1,00	+1,56	+0,90	-1,61	-3,60	-3,42
-10	-10,05	-7,37	-3,60	-0,51	+0,74	+0,93	-0,53	-0,88	-0,23	+0,60	+0,63	-0,63	-2,45	-3,77	-4,09	-3,48	-2,38	-0,88	+0,79	+2,30	+2,33	-0,14	-3,14	-3,45
-20	-8,79	-6,73	-3,74	-1,47	-0,60	-0,98	-1,82	-2,13	-1,58	-0,79	-0,49	-1,00	-1,96	-2,63	-2,90	-2,63	-1,98	-0,78	+1,30	+3,38	+4,57	+2,21	-2,39	-3,06
-30	-6,88	-6,04	-4,15	-2,34	-1,36	-2,17	-2,73	-2,81	-2,28	-1,68	-1,14	-1,00	-1,07	-1,16	-1,28	-1,23	-0,74	+0,44	+2,34	+5,28	+6,84	+3,26	-0,40	-5,19
-40	-4,78	-5,14	-4,44	-3,38	-2,64	-3,49	-3,59	-3,59	-3,35	-2,82	-2,33	-1,84	-0,90	-0,40	-0,07	+0,13	+0,30	+0,79	+2,19	+5,45	+6,96	+6,21	+4,74	-1,76
-50	-2,92	-3,67	-3,87	-3,30	-2,61	-3,93	-4,67	-4,51	-4,59	-4,49	-4,14	-3,53	-2,82	-2,04	-1,70	-1,12	+2,00	+3,49	+5,42	+7,28	+8,03	+6,81	+3,91	+0,26
-60	-0,67	-1,98	-2,92	-2,17	-1,56	-0,84	-0,33	+0,07	+0,05	-0,40	-0,52	-0,40	-0,05	+0,35	+0,77	+1,40	+2,35	+3,77	+5,17	+6,23	+6,44	+5,58	+3,47	+1,40
-70	+0,33	-0,51	-0,82	-0,86	-0,51	0,00	+0,51	+0,95	+1,19	+1,16	+0,74	+0,10	-0,40	-0,82	-0,01	+0,56	+1,33	+2,21	+3,12	+3,84	+4,24	+4,21	+3,70	+2,70	+1,52
-80	+0,73	+0,57	+0,21	+0,14	+0,14	+0,26	+0,37	+0,51	+0,49	+0,37	+0,03	-0,12	-0,12	+0,14	+0,51	+0,90	+1,33	+1,68	+1,96	+2,10	+2,03	+1,82	+1,47	+1,03

Secular changes Δi of inclination i.

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TABLE (48). Secular changes ΔT of the horizontal intensity T between 1550-1600 when time increases by one year. Unit of the 5th decimal. For $\varphi = +90°$, $\Delta T = -0,00106$; for $\varphi = -90°$, $\Delta T = -0,00020$.

φ	λ=0	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+2	+34	+60	+68	+48	+4	-32	-104	-136	-160	-176	-188	-194	-190	-172	-170	-170	-60	-34	-54	-56	-54	-44	-24
+70	-58	+18	+122	+204	+198	+124	+46	-32	-88	-130	-156	-164	-150	-114	-60	+24	+122	+90	-16	-90	-128	-140	-132	-104
+60	-148	-58	+104	+274	+324	+264	+176	+92	+30	-20	-70	-104	-114	-90	-62	-18	+24	+28	-36	-130	-192	-218	-212	-192
+50	-220	-136	+50	+270	+354	+312	+246	+200	+152	+98	+24	-52	-84	-86	-72	-76	-70	-48	-66	-144	-214	-258	-252	-246
+40	-236	-170	+10	+232	+314	+264	+226	+224	+228	+180	+88	-16	-56	-32	-26	-66	-102	-98	-90	-130	-192	-238	-252	-260
+30	-188	-134	+10	+192	+234	+150	+122	+166	+220	+206	+116	0	-36	+24	+96	-12	-104	-122	-96	-100	-144	-184	-202	-206
+20	-104	-58	+48	+172	+138	+20	0	+80	+172	+192	+132	+20	-28	+54	+92	+10	-88	-112	-68	-42	-72	-118	-152	-138
+10	-8	+28	+96	+160	+70	-62	-66	+14	+118	+178	+158	+54	-28	+4	+30	-30	-86	-82	-40	0	-16	-52	-70	-52
0	+40	+72	+106	+124	+34	-62	-36	+44	+110	+164	+184	+96	-32	-94	-108	-126	-98	-48	-8	+6	0	-20	-36	-6
-10	+40	+74	+96	+96	+18	-34	+28	+106	+122	+162	+200	+140	-24	-178	-230	-208	-86	-10	+2	-18	-12	-10	-16	-6
-20	+8	+50	+74	+76	+14	-18	+64	+130	+130	+138	+186	+168	-0	-182	-254	-186	-50	+12	-14	-52	-32	+6	-14	-22
-30	-30	+12	+46	+84	-24	-48	+20	+92	+82	+62	+106	+134	+48	-80	-134	-78	+10	+12	-48	-82	-20	+44	+10	-36
-40	-38	-20	-4	-32	-84	-118	-84	-30	-34	-44	+12	+78	+90	+50	+26	+42	+44	-6	-78	-70	+42	+128	+76	-6
-50	-16	-48	-70	-110	-164	-204	-208	-180	-172	-154	-78	+38	+112	+144	+140	+114	+56	-18	-66	0	+148	+232	+166	+58
-60	+8	-32	-114	-162	-230	-262	-286	-294	-270	-240	-134	+10	+102	+172	+158	+100	+42	-30	-4	+122	+240	+314	+228	+96
-70	+36	-50	-114	-172	-224	-266	-294	-308	-312	-282	-190	-64	+48	+104	+108	+84	+56	+50	+108	+212	+296	+300	+234	+134
-80	+30	-34	-80	-122	-156	-184	-208	-230	-242	-252	-250	-238	-184	+2	+132	+160	+174	+196	+216	+226	+210	+184	+144	+90

TABLE (48). Secular changes ΔT of the horizontal intensity T between 1600-1650 when time increases by one year. Unit of the 5th decimal. For $\varphi = +90°$, $\Delta T = -0,00014$; for $\varphi = -90°$, $\Delta T = +0,00068$

φ	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+68	+120	+162	+170	+146	+88	+22	-40	-92	-126	-136	-130	-104	-80	-52	-24	-70	-58	-86	-82	-74	-56	-26	+16
+70	+20	+128	+252	+324	+314	+236	+124	+20	-56	-92	-94	-82	-48	-10	+34	+66	+30	-44	-134	-180	-196	-174	-124	-64
+60	-68	+68	+256	+392	+404	+332	+220	+120	+44	+8	-2	-6	+2	+8	+10	-20	-58	-120	-200	-262	-288	-260	-214	-158
+50	-148	-14	+188	+364	+398	+336	+252	+192	+158	+130	+94	+64	+52	+52	+6	-78	-152	-192	-232	-270	-302	-286	-262	-214
+40	-154	-60	+114	+274	+332	+214	+158	+184	+212	+208	+148	+86	+80	+116	+76	-46	-170	-216	-208	-232	-252	-260	-240	-202
+30	-112	-44	+80	+192	+128	+18	-4	+74	+166	+200	+144	+70	+80	+168	+118	+18	-126	-184	-152	-126	-146	-180	-186	-132
+20	-26	+14	+88	+116	-2	-148	-156	-50	+78	+144	+114	+48	+66	+184	+200	+80	-62	-118	-78	-28	-34	-80	-100	-62
+10	+52	+78	+112	+72	-86	-232	-222	-118	+18	+112	+116	+46	+10	+96	+114	+42	-20	-34	+28	+74	+64	-6	-42	0
0	+70	+90	+86	+26	-130	-218	-160	-70	+34	+100	+134	+62	-44	-68	-84	-78	-20	+56	+104	+130	+102	+34	-14	+18
-10	+36	+58	+32	-14	-124	-144	-28	+54	+82	+106	+144	+86	-82	-208	-260	-164	-8	+126	+160	+140	+102	+32	-38	-14
-20	-34	-4	+6	-36	-104	-70	+78	+158	+126	+94	+114	+64	-94	-264	-296	-156	+50	+178	+158	+98	+82	+32	-38	-62
-30	-90	-52	-26	-58	-104	-66	+84	+178	+124	+48	+52	+46	-48	-164	-174	-42	+116	+172	+110	+50	+80	+56	-36	-100
-40	-102	-76	-76	-104	-156	-128	-10	+66	+30	-56	-54	-2	-10	-32	0	+84	+150	+128	+48	+56	+142	+138	+30	-82
-50	-70	-92	-118	-158	-192	-186	-118	-60	-72	-136	-132	-52	+30	+82	+122	+138	+116	+54	+30	+114	+240	+248	+142	+4
-60	-10	-62	-126	-186	-218	-246	-218	-170	-174	-174	-150	-72	+34	+88	+130	+118	+56	+28	+58	+182	+312	+306	+214	+96
-70	+48	-36	-108	-170	-204	-224	-220	-208	-202	-196	-168	-78	-6	+48	+58	+54	+38	+66	+152	+262	+326	+318	+244	+144
-80	+82	+28	-20	-56	-88	-110	-130	-136	-142	-138	-142	-150	-124	+56	+106	+134	+166	+198	+230	+246	+248	+228	+190	+138

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TABLE (48). Secular changes ΔT of horizontal intensity T between 1650-1700 in units of 5th decimal when time is increased by one year. For $\varphi = +90°$, $\Delta T = +0.00182$; for $\varphi = -90°$, $\Delta T = +0.00178$

φ	$\lambda=0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+120	+138	+150	+150	+140	+128	+122	+124	+136	+156	+176	+194	+208	+220	+236	+240	+266	+32	-4	+6	+34	+44	+70	+92
+70	+134	+198	+236	+216	+148	+72	+12	0	+16	+52	+98	+144	+176	+184	+152	+52	-142	-338	-264	-154	-70	-16	+22	+68
+60	+138	+270	+358	+338	+210	+98	-68	-114	-98	-56	+8	+94	+186	+240	+204	+84	-92	-266	-318	-258	-162	-92	-36	+38
+50	+82	+250	+458	+452	+282	+64	-90	-158	-164	-134	-76	+46	+188	+392	+280	+170	+2	-172	-308	-344	-286	-216	-136	-56
+40	-12	+248	+486	+516	+330	+128	-8	-100	-138	-156	-128	-4	+178	+320	+318	+206	+72	-82	-248	-358	-368	-306	-238	-160
+30	-74	+172	+426	+466	+326	+184	+94	+34	-20	-84	-110	-36	+142	+278	+258	+164	+74	-30	-180	-328	-394	-354	-278	-220
+20	-90	+102	+314	+340	+224	+184	+196	+180	+122	+40	-36	-52	+40	+120	+80	+20	+16	-30	-134	-268	-346	-322	-252	-186
+10	-48	+78	+182	+154	+78	+142	+256	+296	+268	+194	+70	-10	-72	-80	-114	-114	-72	-52	-104	-184	-240	-234	-184	-116
0	+22	+66	+86	-14	-82	+60	+246	+332	+344	+322	+184	-22	-174	-246	-248	-186	-108	-64	-66	-90	-122	-148	-92	-28
-10	+64	+54	-10	-152	-208	-30	+198	+310	+362	+360	+246	+8	-206	-302	-260	-166	-78	-52	-10	+24	+2	-42	-12	+36
-20	+40	+4	-106	-274	-314	-122	+120	+242	+290	+310	+236	+30	-154	-238	-188	-84	-18	+16	+78	+144	+110	+20	-4	+18
-30	-22	-72	-190	-328	-346	-170	+44	+150	+174	+192	+128	+74	-62	-124	-72	+2	+54	+98	+180	+258	+206	+70	-4	-14
-40	-90	-156	-240	-334	-334	-202	-40	+36	+26	+36	+72	+76	+44	+20	+32	+62	+92	+148	+270	+346	+278	+120	+2	-52
-50	-118	-176	-242	-292	-294	-228	-146	-126	-166	-140	-50	+52	+86	+86	+84	+88	+128	+212	+332	+390	+320	+144	+30	-54
-60	-76	-138	-186	-222	-228	-212	-206	-246	-316	-318	-174	-20	+66	+96	+106	+122	+168	+266	+378	+422	+356	+234	+112	+10
-70	+8	-48	-86	-112	-148	-150	-188	-252	-354	-450	-330	-108	+42	+108	+156	+192	+262	+354	+420	+418	+358	+256	+160	+78
-80	+102	+64	+28	-2	-34	-58	-82	-106	-128	-146	-128	+48	+382	+402	+410	+428	+436	+430	+406	+370	+324	+262	+200	+152

TABLE (48). Secular changes ΔT of horizontal intensity T between 1700-1780 in units of 5th decimal when time is increased by one year. For $\varphi = +90°$, $\Delta T = +0.00175$; for $\varphi = -90°$, $\Delta T = +0.00528$

φ	$\lambda=0°$	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+257	+266	+261	+232	+179	+100	+7	-81	-154	-188	-194	-177	-150	-116	-74	-4	+130	+197	+208	+211	+216	+223	+231	+245
+70	+152	+202	+225	+205	+137	+21	-101	-198	-230	-191	-119	-40	+17	+50	+50	+23	-49	-216	-82	-26	+2	+30	+60	+105
+60	+23	+95	+146	+142	+96	+1	-85	-136	-112	-26	+72	+162	+219	+239	+213	+126	-20	-204	-333	-314	-257	-189	-120	-52
+50	-29	+42	+90	+96	+71	+30	-12	-20	+26	+111	+193	+258	+306	+323	+276	+157	+5	-156	-276	-380	-383	-314	-221	-122
+40	-23	+39	+77	+80	+66	+45	+34	+48	+91	+150	+189	+218	+254	+266	+219	+126	+10	-107	-226	-325	-355	-299	-204	-104
+30	+7	+71	+105	+97	+67	+45	+44	+56	+80	+99	+94	+92	+102	+104	+76	+32	-12	-75	-167	-249	-270	-220	-137	-64
+20	+14	+90	+121	+106	+71	+61	+57	+54	+50	+23	-23	-49	-56	-69	-79	-66	-47	-54	-115	-171	-194	-150	-94	-45
+10	-5	+82	+122	+92	+62	+87	+106	+92	+71	-31	-104	-143	-176	-188	-184	-132	-59	-26	-71	-133	-148	-124	-95	-69
0	-16	+70	+80	+29	+34	+120	+188	+176	+105	-10	-115	-186	-236	-248	-224	-130	-39	+7	-15	-79	-117	-135	-124	-94
-10	-11	+99	+11	-65	-30	+121	+241	+263	+194	+76	-54	-161	-203	-200	-157	-67	+17	+60	+42	-21	-109	-136	-119	-95
-20	-2	+12	-67	-158	-105	+72	+226	+287	+261	+162	+22	-90	-115	-81	-20	+35	+64	+69	+71	+23	-74	-145	-139	-71
-30	-47	-69	-162	-237	-186	-23	+125	+207	+237	+200	+104	+15	+7	+55	+96	+100	+72	+60	+86	+76	-14	-110	-129	-90
-40	-124	-161	-230	-270	-227	-126	-32	+41	+114	+161	+146	+107	+111	+138	+146	+107	+52	+49	+107	+126	+52	-55	-111	-120
-50	-163	-203	-236	-242	-213	-170	-145	-124	-57	+31	+97	+105	+111	+120	+100	+56	+27	+72	+180	+236	+173	+54	-54	-124
-60	-106	-142	-155	-138	-121	-110	-132	-176	-208	-161	-70	-14	+9	+14	+7	+10	+65	+185	+318	+371	+313	+189	+61	-40
-70	+92	+55	+42	+42	+54	+44	+22	-17	-92	-238	-255	-119	-61	-16	+41	+132	+257	+389	+487	+510	+458	+362	+252	+160
-80	+349	+314	+293	+286	+282	+283	+296	+310	+336	+387	+474	+529	+495	+475	+492	+530	+567	+596	+607	+592	+551	+500	+443	+388

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TABLE (48). Secular changes ΔT of horizontal intensity T between 1780-1842 in units of 5th decimal when time is increased by one year. For $\varphi = +90°$ $\Delta T = +0,00005$; for $\varphi = -90°$, $\Delta T = -0,00073$.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+73	+85	+90	+89	+84	+79	+73	+66	+69	+74	+87	+108	+131	+150	+156	+124	+26	-85	-126	-116	-79	-34	+13	+48
+70	+199	+190	+163	+129	+81	+34	-10	-48	-68	-68	-50	-13	+34	+95	+169	+237	+290	+201	-279	-193	-79	+34	+127	+179
+60	+325	+287	+199	+92	-18	-106	-190	-244	-256	-241	-212	-193	-163	-105	-8	+105	+175	+123	-85	-145	-23	+123	+230	+306
+50	+414	+352	+204	+29	-134	-261	-342	-387	-379	-341	-318	-323	-342	-334	-260	-137	-29	-10	-63	-69	+43	+182	+312	+400
+40	+521	+448	+266	+31	-164	-284	-345	-373	-366	-331	-311	-347	-416	-472	-445	-342	-217	-135	-87	-27	+69	+185	+331	+464
+30	+589	+503	+303	+76	-84	-156	-140	-211	-217	-207	-199	-244	-326	-414	-438	-381	-276	-185	-94	-16	+50	+135	+298	+489
+20	+578	+477	+280	+108	+32	+21	+31	+13	-18	-40	-45	-68	-118	-195	-245	-244	-206	-153	-94	-52	-21	+34	+217	+461
+10	+413	+282	+110	+47	+94	+153	+203	+212	+188	+145	+115	+111	+123	+95	+50	-5	-61	-87	-92	-105	-126	-90	+90	+336
0	+113	-48	-158	-81	+85	+203	+266	+306	+299	+263	+231	+260	+311	+325	+293	+193	+76	-26	-108	-175	-219	-199	-56	+110
-10	-227	-398	-441	-250	+15	+169	+250	+301	+325	+308	+288	+314	+377	+413	+385	+285	+152	+26	-94	-183	-233	-245	-191	-144
-20	-449	-607	-595	-344	-50	+118	+187	+244	+282	+285	+271	+290	+331	+355	+333	+263	+180	+108	+15	-65	-134	-187	-223	-300
-30	-454	-581	-545	-321	-71	+76	+129	+161	+177	+199	+193	+201	+207	+214	+212	+212	+220	+237	+203	+152	+79	+2	-115	-271
-40	-248	-350	-325	-184	-13	+90	+118	+124	+124	+124	+111	+98	+90	+97	+123	+180	+274	+369	+411	+403	+347	+248	+98	-79
-50	+23	-61	-69	-13	+61	+105	+119	+123	+113	+100	+77	+63	+56	+61	+103	+191	+311	+443	+521	+542	+519	+440	+316	+166
-60	+225	+148	+103	+87	+94	+95	+98	+110	+127	+140	+116	+90	+76	+84	+118	+196	+298	+398	+469	+511	+522	+492	+419	+326
-70	+252	+198	+144	+106	+77	+48	+29	+13	+27	+90	+131	+69	+50	+55	+71	+110	+164	+228	+285	+334	+361	+365	+345	+298
-80	+115	+95	+65	+31	+5	-26	-61	-92	-124	-158	-185	-190	-171	-135	-105	-66	-26	+15	+56	+90	+119	+137	+142	+134

TABLE (48). Secular changes ΔT of horizontal intensity T between 1842-1885 in units of 5th decimal when time is increased by one year. For $\varphi = +90°$, $\Delta T = -0,00318$; for $\varphi = -90°$, $\Delta T = +0,00243$.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-119	-144	-161	-186	-203	-230	-241	-257	-253	-239	-203	-172	-133	-105	-72	-40	-14	+2	-12	-16	-37	-49	-70	-95
+70	-79	-131	-177	-219	-257	-300	-346	-366	-341	-280	-221	-177	-139	-112	-86	-58	-44	-35	+25	+28	+30	+19	+2	-32
+60	+14	-52	-133	-196	-262	-325	-373	-383	-346	-271	-226	-186	-159	-135	-121	-110	-105	-119	-116	+14	+105	+133	+123	+81
+50	+135	+58	-23	-110	-184	-241	-285	-302	-278	-239	-191	-168	-142	-133	-137	-137	-147	-159	-161	-44	+119	+234	+241	+196
+40	+198	+137	+65	-12	-77	-121	-156	-177	-179	-170	-151	-123	-86	-56	-25	-110	-151	-186	-198	-110	+56	+209	+266	+248
+30	+172	+151	+102	+49	+12	+2	+2	-16	-67	-114	-137	-110	-60	-16	+14	-27	-107	-161	-196	-168	-79	+97	+184	+203
+20	+77	+81	+90	+79	+83	+110	+147	+144	+79	-7	-77	-79	-7	+65	+93	+56	-12	-90	-166	-193	-151	-47	+54	+81
+10	-52	-28	+18	+88	+151	+214	+278	+278	+219	+116	+19	-44	-28	+30	+65	+58	+13	-54	-156	-253	-278	-214	-116	-61
0	-170	-144	-67	+67	+174	+266	+325	+347	+316	+228	+100	-17	-110	-97	-79	-67	-61	-112	-219	-343	-435	-380	-262	-179
-10	-248	-221	-116	+37	+151	+209	+226	+239	+250	+214	+102	-56	-205	-283	-285	-260	-239	-271	-360	-502	-613	-574	-411	-285
-20	-313	-273	-179	-58	+19	+21	-12	-23	+5	+35	-7	-133	-283	-386	-423	-406	-397	-418	-495	-630	-738	-704	-535	-363
-30	-348	-332	-283	-221	-191	-239	-318	-341	-280	-217	-172	-203	-271	-343	-383	-404	-411	-439	-474	-588	-704	-706	-563	-404
-40	-366	-388	-404	-395	-400	-439	-486	-509	-472	-397	-295	-226	-191	-188	-198	-217	-226	-201	-205	-285	-430	-488	-441	-369
-50	-323	-406	-479	-504	-500	-465	-439	-425	-413	-378	-295	-184	-97	-30	-7	+23	+86	+170	+209	+143	+2	-133	-207	-255
-60	-224	-339	-425	-446	-416	-332	-229	-123	-86	-144	-174	-128	-47	+37	+110	+261	+318	+458	+523	+488	+360	+203	+49	-88
-70	-83	-193	-262	-276	-239	-161	-44	+79	+174	+203	+44	-135	-90	-7	+114	+253	+400	+520	+572	+558	+476	+355	+207	+65
-80	+47	-12	-44	-61	-61	-35	-2	+40	+56	+49	+7	-28	-25	+23	+105	+182	+260	+318	+346	+346	+316	+260	+193	+116

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TABLE (49). Secular changes ΔI of the total intensity I in units of the 5th decimal between 1550-1600 when the time is increased by one year. For $\varphi = +90°$, $\Delta I = +0.00066$; for $\varphi = -90°$, $\Delta I = -0.00036$.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+96	+64	+32	+106	+134	+168	+192	+212	+214	+200	+166	+120	+72	+16	-28	-56	-84	-92	-88	-70	-48	-20	+8	+30
+70	+20	+18	+18	+38	+80	+152	+238	+310	+352	+332	+274	+172	+62	-42	-128	-196	-228	-234	-212	-168	-112	-50	-10	+14
+60	+22	-26	-84	-96	-68	+34	+182	+330	+416	+418	+330	+204	+58	-62	-158	-238	-290	-310	-272	-192	-92	-4	+50	+56
+50	+70	-14	-126	-222	-250	-146	+48	+252	+390	+472	+392	+206	+76	-40	-118	-190	-248	-294	-274	-180	-40	+80	+130	+118
+40	+148	+42	-118	-294	-368	-288	-82	+142	+300	+344	+304	+198	+96	+8	-56	-104	-182	-240	-246	-144	+18	+152	+208	+198
+30	+224	+114	-84	-302	-404	-334	-148	+96	+188	+252	+246	+180	+92	+18	-16	-40	-98	-168	-184	-102	+52	+138	+270	+270
+20	+256	+160	-28	-240	-336	-272	-124	+22	+140	+192	+196	+160	+80	-12	-52	-42	-60	-102	-116	-58	+60	+134	+264	+286
+10	+230	+166	+8	-146	-186	-120	-46	+28	+126	+178	+172	+120	+38	-76	-116	-84	-66	-64	-58	-16	+44	+122	+196	+230
0	+132	+126	+46	-10	+30	+88	+62	+82	+164	+204	+154	+62	-16	-120	-158	-132	-106	-58	0	+14	-10	-20	+26	+94
-10	+12	+70	+38	+154	+244	+258	+166	+150	+222	+264	+180	+34	-78	-164	-198	-192	-148	-50	+54	+44	-80	-192	-178	-88
-20	-104	+32	+150	+380	+420	+402	+296	+256	+312	+340	+234	+42	-126	-228	-268	-252	-170	-24	+92	+40	-166	-350	-370	-256
-30	-194	-4	+186	+372	+498	+492	+402	+352	+374	+376	+264	+64	-144	-280	-324	-286	-138	+6	+96	-8	-266	-482	-518	-388
-40	-252	-30	+188	+380	+510	+524	+466	+402	+388	+358	+246	+58	-138	-276	-312	-244	-98	+44	+72	-110	-326	-536	-578	-460
-50	-264	-52	+146	+324	+440	+466	+426	+380	+336	+284	+188	+50	-98	-196	-270	-196	-36	+50	+24	-124	-344	-512	-558	-444
-60	-244	-84	+86	+224	+302	+342	+322	+276	+238	+190	+126	+42	-42	-90	-96	-58	0	+18	-34	-150	-298	-406	-442	-386
-70	-178	-80	+24	+102	+158	+180	+182	+174	+138	+106	+62	+26	-14	-32	-32	-24	-18	-34	-80	-144	-222	-274	-294	-256
-80	-102	-70	-40	0	+22	+40	+50	+48	+42	+26	+22	+10	-6	-16	-20	-28	-44	-58	-78	-102	-122	-132	-138	-126

TABLE (49). Secular changes ΔI of the total intensity I in units of the 5th decimal between 1600-1650 when the time is increased by one year. For $\varphi = +90°$, $\Delta I = +0.00088$; for $\varphi = -90°$, $\Delta I = -0.00038$.

φ \ λ	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+50	+62	+76	+98	+136	+162	+198	+220	+228	+214	+184	+144	+88	+40	-6	-34	-52	-50	-38	-22	-4	+16	+28	+40
+70	-12	-58	-44	-16	+42	+134	+242	+330	+364	+358	+280	+178	+66	-34	-114	-156	-170	-156	-118	-56	+6	+34	+44	+26
+60	-30	-122	-194	-228	-178	-26	+160	+332	+426	+422	+334	+184	+32	-84	-152	-198	-196	-174	-114	-20	+68	+124	+108	+50
+50	-14	-156	-232	-290	-376	-226	+16	+256	+402	+412	+308	+160	+20	-56	-90	-106	-118	-104	-46	+64	+174	+234	+202	+104
+40	+68	-96	-294	-466	-514	-388	-194	+124	+298	+326	+246	+120	-2	-48	-26	-2	+4	-8	+32	+138	+272	+342	+312	+204
+30	+132	-10	-258	-470	-558	-450	-224	+8	+156	+208	+160	+78	-14	-50	-10	+64	+102	+96	+104	+188	+316	+396	+362	+270
+20	+170	+28	-188	-398	-466	-378	-230	-66	+58	+120	+112	+58	-36	-106	-66	+56	+126	+130	+128	+188	+302	+380	+370	+280
+10	+164	+60	-100	-254	-276	-242	-212	-124	+20	+114	+110	+54	-58	-154	-132	-8	+78	+100	+122	+156	+222	+272	+274	+228
0	+106	+58	-24	-70	-44	-34	-188	-150	+30	+158	+152	+58	-56	-154	-156	-84	-30	+28	+30	+112	+90	+88	+104	+116
-10	+34	+62	+74	+124	+160	+48	-112	-106	+82	+232	+218	+96	-38	-120	-152	-142	-126	-26	+80	+86	-32	-132	-130	-44
-20	-42	+58	+156	+274	+322	+204	+18	-6	+160	+312	+298	+130	-42	-148	-192	-208	-152	-4	+116	+64	-146	-324	-330	-190
-30	-124	+54	+210	+348	+414	+314	+166	+128	+240	+355	+332	+162	-30	-178	-244	-230	-118	+50	+142	+18	-240	-466	-490	-334
-40	-188	+34	+214	+364	+432	+372	+262	+208	+250	+318	+298	+160	-32	-172	-236	-172	-30	+114	+132	-30	-316	-540	-576	-424
-50	-228	-18	+168	+302	+368	+336	+275	+218	+224	+242	+224	+124	-8	-102	-130	-64	+42	+120	+94	-80	-326	-512	-544	-434
-60	-226	-56	+92	+190	+248	+234	+202	+180	+160	+150	+126	+72	+16	-26	-18	+30	+82	+102	+40	-104	-276	-410	-448	-366
-70	-176	-98	-16	+56	+104	+112	+104	+82	+78	+68	+60	+44	+34	+30	+38	+50	+62	+44	-8	-96	-194	-256	-272	-242
-80	-106	-74	-38	-12	+6	+20	+16	+16	+14	+16	+12	+6	+12	+10	+10	+10	+8	-16	-42	-78	-106	-132	-138	-128

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TABLE (49). Secular changes ΔI of the total intensity I in units of the 5th decimal between 1650-1700 when the time is increased by one year. For $\varphi = +90°$, $\Delta I = -0.00030$; for $\varphi = -90°$, $\Delta I = -0.00086$.

φ	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-14	-24	-30	-34	-48	-52	-76	-90	-96	-102	-96	-86	-54	-26	+12	+42	+68	+76	+82	+76	+62	+36	+20	-2
+70	-30	-46	-46	-42	-28	-30	-52	-90	-122	-166	-164	-140	-80	-2	+86	+152	+204	+222	+216	+180	+126	+76	+24	-14
+60	-98	-128	-134	-92	-18	+32	+34	-12	-102	-170	-194	-166	-94	+8	+122	+234	+304	+352	+334	+274	+180	+84	+2	-50
+50	-136	-220	-272	-226	-70	+86	+144	+92	-22	-106	-160	-162	-132	-44	+82	+246	+350	+408	+420	+360	+256	+114	+14	-56
+40	-152	-308	-446	-406	-176	+100	+244	+206	+88	-14	-88	-148	-200	-162	-26	+164	+306	+396	+442	+428	+322	+174	+36	-50
+30	-88	-322	-536	-520	-234	+104	+274	+256	+176	+90	-4	-136	-278	-312	-170	+40	+204	+322	+414	+462	+392	+244	+110	+20
+20	-6	-262	-508	-490	-264	+104	+262	+276	+214	+142	+54	-118	-330	-408	-278	-82	+98	+204	+316	+400	+386	+280	+162	+106
+10	+60	-148	-358	-298	-40	+160	+244	+280	+258	+192	+88	-84	-298	-402	-304	-140	-14	+72	+148	+220	+244	+212	+158	+140
0	+82	-30	-88	+36	+204	+248	+252	+300	+316	+266	+146	-6	-196	-302	-268	-184	-106	-74	-76	-70	-18	+40	+80	+102
-10	+60	+78	+170	+338	+442	+336	+286	+356	+426	+376	+238	+74	-84	-192	-222	-206	-168	-198	-286	-378	-332	-192	-50	+54
-20	+12	+140	+316	+470	+482	+378	+342	+428	+516	+484	+328	+148	-16	-140	-202	-202	-196	-266	-426	-566	-554	-404	-214	-92
-30	-38	+132	+330	+476	+470	+400	+396	+508	+606	+592	+430	+218	+8	-126	-168	-168	-176	-272	-468	-632	-656	-528	-342	-180
-40	-110	+58	+236	+362	+396	+388	+436	+552	+662	+640	+484	+254	+52	-80	-120	-126	-156	-272	-442	-600	-642	-564	-418	-264
-50	-192	-34	+120	+238	+308	+368	+440	+548	+620	+596	+464	+276	+98	-32	-74	-96	-130	-240	-396	-534	-584	-552	-456	-326
-60	-236	-118	0	+114	+208	+296	+378	+452	+490	+472	+380	+248	+118	+18	-38	-90	-146	-238	-348	-446	-494	-486	-424	-338
-70	-238	-144	-54	+36	+104	+150	+254	+304	+320	+302	+248	+174	+92	+18	-40	-98	-160	-218	-290	-346	-378	-382	-354	-304
-80	-176	-138	-92	-48	+2	+40	+82	+106	+116	+110	+80	+56	+18	-22	-64	-102	-142	-176	-206	-228	-242	-246	-232	-210

TABLE (49). Secular changes ΔI of the total intensity I in units of the 5th decimal between 1700-1780 when the time is increased by one year. For $\varphi = +90°$, $\Delta I = -0.00191$; for $\varphi = -90°$, $\Delta I = -0.00200$.

φ	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-408	-400	-368	-312	-242	-166	-89	-22	+17	+41	+41	+27	0	-26	-56	-89	-119	-149	-188	-231	-275	-319	-363	-389
+70	-537	-560	-524	-424	-276	-105	+56	+177	+241	+257	+217	+152	+82	+27	-11	-25	-37	-55	-86	-135	-193	-276	-368	-466
+60	-512	-606	-591	-475	-279	-47	+174	+321	+392	+364	+261	+126	+12	-49	-42	-9	+37	+51	+55	+40	+5	-71	-194	-363
+50	-396	-551	-582	-479	-274	-19	+213	+369	+472	+339	+185	-7	-148	-193	-137	-34	+67	+131	+166	+135	+214	+175	+40	-173
+40	-257	-446	-505	-426	-238	-5	+199	+319	+330	+233	+51	-163	-313	-335	-224	-21	+82	+167	+231	+364	+379	+370	+237	+2
+30	-157	-336	-402	-332	-181	-2	+151	+216	+212	+103	-67	-273	-424	-436	-307	-110	+56	+161	+242	+343	+437	+438	+308	+87
+20	-99	-258	-275	-197	-77	+35	+112	+142	+116	+25	-121	-289	-426	-439	-319	-136	+16	+126	+218	+325	+406	+404	+287	+97
+10	-59	-133	-97	+11	+79	+96	+95	+85	+40	-30	-119	-236	-337	-360	-277	-142	-10	+76	+142	+217	+283	+282	+197	+64
0	-27	-6	+107	+231	+250	+187	+131	+84	+22	-42	-81	-131	-207	-254	-227	-127	-26	+23	+29	+40	+77	+90	+59	+6
-10	-11	+110	+252	+399	+375	+297	+225	+164	+75	-2	-31	-42	-96	-163	-177	-105	-12	-1	-89	-175	-194	-160	-121	-95
-20	-12	+179	+366	+461	+437	+381	+352	+305	+197	+84	+35	+21	-22	-90	-106	-39	+30	-15	-185	-368	-446	-402	-304	-171
-30	-65	+154	+336	+406	+425	+438	+463	+435	+327	+194	+121	+86	+54	+4	-10	+45	+77	-22	-252	-496	-626	-606	-475	-286
-40	-167	+44	+195	+282	+344	+425	+501	+516	+436	+324	+243	+201	+168	+137	+130	+146	+114	-48	-318	-602	-766	-765	-619	-405
-50	-332	-149	-6	+104	+208	+329	+441	+494	+477	+416	+354	+319	+292	+274	+243	+197	+92	-110	-387	-652	-822	-844	-732	-548
-60	-496	-339	-201	-77	+54	+191	+314	+400	+431	+424	+402	+377	+355	+320	+262	+171	+17	-189	-430	-648	-798	-845	-790	-659
-70	-554	-441	-327	-212	-84	+39	+146	+236	+291	+321	+329	+317	+288	+243	+168	+66	-75	-248	-423	-576	-681	-731	-719	-652
-80	-450	-389	-329	-250	-176	-102	-35	+23	+67	+96	+112	+105	+84	+47	-7	-80	-164	-251	-337	-413	-469	-500	-506	-488

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TABLE (49). Secular changes ΔI of the total intensity I in units of the 5th decimal between 1780-1842 when the time is increased by one year. For $\varphi = +90°$, $\Delta I = +0.00065$; for $\varphi = -90°$, $\Delta I = +0.00233$.

φ	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	+190	+139	+82	+26	-19	-52	-79	-102	-118	-126	-134	-135	-123	-106	-76	-29	+23	+84	+144	+195	+233	+252	+253	+225
+70	+222	+126	+27	-60	-129	-177	-203	-214	-227	-240	-255	-269	-290	-292	-274	-215	-121	+ 6	+144	+248	+347	+382	+361	+304
+60	+166	+63	-40	-116	-174	-203	-217	-219	-222	-240	-272	-311	-366	-416	-449	-405	-282	-89	+113	+279	+376	+395	+357	+274
+50	+ 71	-16	-74	-102	-113	-115	-103	-97	-106	-144	-195	-252	-329	-419	-490	-489	-361	-140	+95	+279	+350	+349	+279	+179
+40	-32	-92	-79	-34	0	+32	+61	+81	+55	- 8	-84	-132	-179	-268	-369	-414	-325	-113	+108	+250	+285	+258	+188	+ 77
+30	-131	-166	-81	+24	+121	+169	+212	+231	+193	+118	+42	+15	+16	- 11	-119	-214	-183	-45	+111	+188	+201	+180	+118	-13
+20	-201	-188	-63	+56	+135	+191	+248	+274	+240	+167	+118	+129	+199	+272	+113	- 2	-36	+23	+ 90	+108	+108	+ 98	+ 43	- 89
+10	-207	-126	- 2	+48	+ 77	+127	+204	+240	+225	+172	+147	+180	+274	+323	+258	+142	+ 58	+ 37	+ 34	+ 16	+ 10	+ 16	- 26	-140
0	-123	+24	+102	+52	+ 11	+ 58	+139	+183	+175	+153	+156	+204	+288	+339	+321	+211	+ 94	+ 5	- 56	- 98	-105	- 79	- 97	-156
-10	- 32	+131	+134	+11	- 52	+ 10	+111	+160	+155	+153	+174	+219	+288	+342	+345	+253	+ 95	- 55	-167	-215	-214	-190	-183	-160
-20	- 36	+89	+66	- 48	- 94	- 18	+87	+150	+171	+183	+203	+244	+300	+358	+363	+269	+ 92	- 90	-231	-298	-316	-304	-272	-191
-30	-123	- 34	- 55	- 111	- 115	- 36	+ 60	+131	+164	+199	+217	+248	+295	+352	+366	+285	+119	- 63	-207	-290	-329	-333	-312	-240
-40	-161	-118	-108	-110	- 74	- 6	+ 60	+111	+147	+175	+191	+211	+258	+311	+337	+295	+174	+ 45	- 66	-129	-171	-206	-230	-209
-50	- 47	- 37	- 27	- 10	+ 18	+ 55	+ 90	+118	+131	+139	+155	+166	+203	+261	+312	+323	+280	+228	+180	+139	+ 98	+ 48	- 3	- 34
-60	+191	+167	+161	+156	+160	+153	+153	+145	+145	+144	+153	+177	+212	+271	+333	+382	+417	+432	+429	+417	+390	+350	+292	+235
-70	+445	+398	+365	+341	+316	+292	+271	+247	+230	+223	+227	+255	+296	+349	+414	+475	+532	+575	+602	+608	+599	+573	+537	+489
-80	+575	+540	+511	+478	+451	+424	+408	+387	+376	+381	+389	+405	+429	+459	+503	+538	+573	+607	+627	+643	+647	+639	+623	+602

TABLE (49). Secular changes ΔI of the total intensity I in units of the 5th decimal between 1842-1885 when the time is increased by one year. For $\varphi = +90°$, $\Delta I = -0.00528$; for $\varphi = -90°$, $\Delta I = +0.00276$.

φ	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°
+80°	-336	-332	-323	-323	-323	-332	-346	-360	-373	-395	-404	-416	-432	-432	-434	-423	-413	-397	-383	-369	-360	-350	-346	-341
+70	-234	-212	-193	-174	-166	-166	-182	-209	-248	-296	-332	-373	-402	-406	-411	-400	-373	-339	-307	-283	-269	-271	-262	-253
+60	-188	-116	-53	- 9	+ 5	+ 14	+ 14	- 7	- 54	-121	-209	-290	-341	-364	-364	-341	-313	-276	-248	-224	-232	-253	-264	-243
+50	-205	- 63	+ 58	+137	+170	+182	+182	+154	+100	0	-112	-207	-248	-253	-255	-243	-230	-201	-177	-188	-239	-311	-346	-309
+40	-295	- 95	+ 77	+193	+255	+269	+287	+273	+224	+102	- 25	-139	-177	-168	-154	-149	-135	-121	-123	-168	-269	-395	-477	-443
+30	-393	-166	+ 25	+166	+228	+292	+316	+318	+260	+139	+ 5	- 95	-128	-107	- 86	- 65	- 61	- 47	- 58	-137	-280	-460	-574	-546
+20	-409	-179	+ 5	+116	+198	+253	+304	+323	+273	+168	+ 32	-102	-114	-110	- 61	- 21	- 2	+ 5	- 40	-133	-302	-488	-611	-586
+10	-311	- 97	+ 25	+ 86	+142	+228	+290	+307	+257	+161	+ 52	- 40	-102	-112	- 83	- 37	- 16	- 28	- 86	-167	-316	-493	-579	-509
0	-126	+ 30	+ 67	+ 67	+107	+209	+307	+334	+285	+170	+ 58	- 32	-100	-119	-114	- 83	- 75	-119	-205	-309	-430	-502	-502	-353
-10	+49	+159	+137	+ 95	+128	+226	+332	+364	+320	+205	+ 72	- 25	-110	-159	-170	-170	-182	-257	-376	-506	-595	-586	-458	-209
-20	+135	+237	+188	+123	+133	+198	+276	+304	+273	+184	+ 63	- 56	-159	-237	-273	-287	-327	-441	-616	-783	-831	-734	-490	-144
-30	+116	+224	+191	+102	+ 47	+ 49	+ 77	+ 93	+102	+ 47	- 19	-126	-243	-332	-380	-420	-490	-658	-869	-1056	-1093	-935	-604	-196
-40	- 16	+128	+100	- 21	- 161	- 262	- 297	- 287	- 221	- 123	- 88	- 219	- 395	- 360	- 409	- 474	- 574	- 760	-1000	-1185	-1232	-1061	-727	-334
-50	-182	- 75	- 114	- 257	- 436	- 579	- 658	- 649	- 565	- 453	- 357	- 292	- 273	- 271	- 300	- 364	- 493	- 697	- 921	-1102	-1147	-1016	- 750	- 434
-60	-295	- 241	- 300	- 432	- 609	- 745	- 824	- 813	- 727	- 583	- 432	- 290	- 184	- 123	- 114	- 163	- 285	- 467	- 649	- 795	- 845	- 783	- 630	- 441
-70	-311	- 311	- 369	- 467	- 579	- 681	- 727	- 711	- 630	- 497	- 348	- 207	- 88	- 7	+ 25	+ 2	- 63	- 166	- 285	- 373	- 432	- 430	- 395	- 341
-80	-221	- 248	- 278	- 325	- 364	- 393	- 400	- 371	- 332	- 273	- 203	- 120	- 54	0	+ 25	+ 37	+ 14	- 19	- 56	- 102	- 142	- 168	- 191	- 201

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The positive values of the tables above are separated from /53
the negative values by thick lines which indicate the locations on the Earth's surface where the secular motion was zero during this period. In order to research the character of the secular changes $\Delta P, \Delta F, \Delta X, \Delta Y, \Delta Z, \Delta\delta, \Delta i, \Delta T$ and ΔJ, which I will call $\Delta\gamma$ in short, by using the nine tables (41)-(49) for the 17 parallel circles and the 24 meridians I calculated the numbers m and M of the following tables (50), (51), (52) and (53). The quantities m of a parallel circle in (50) is the arithmetic mean of the 24 values $\Delta\gamma$ on a circle, formed without consideration of the sines of the individual values $\Delta\gamma$ of the tables above. M in (51) is the arithmetic mean with consideration of the sines. Also the m of a meridian of Table (52) is the arithmetic mean of the 17 values $\Delta\gamma$ in them without consideration of the sine of the individual quantities $\Delta\gamma$. M in Table (53) is the average with consideration of the sine. m represents the quantity of the average yearly secular change. M is the true average change. In the following tables (50), (51), (52), (53), for brevity, the time is called I between 1550-1600, II between 1600-1650, III between 1650-1700, IV between 1700-1780 and V between 1780-1842 and VI between 1842-1885.

Regarding Tables (50), (51), (52) and (53), we should note /55
that we did not consider the values of $\Delta\gamma$ which apply for the poles when they were derived from (41)-(49). In the calculation of $\Delta\delta$ from (46), only the 11 parallel circles $\varphi = +50°, +40°$ ...-40-50° were considered in the calculation. Finally, $\Delta P, \Delta F, \Delta X, \Delta Y, \Delta Z, \Delta T, \Delta J$ are expressed in units of the 5th decimal in the nine tables (41)-(49), and in (50), (51), (52), (53) as well. $\Delta\delta$ and Δi are expressed in minutes.

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TABLE (50). III.

φ = +80°	+70°	+60°	+50°	+40°	+30°	+20°	+10°	0°	-10°	-20°	-30°	-40°	-50°	-60°	-70°	-80°	average
I ΔP_{π} ± 22	27	46	71	94	111	126	131	131	123	124	120	115	103	81	53	27	88
II ΔP_{π} ± 26	52	72	97	124	155	183	205	219	231	228	224	205	177	142	101	53	147
III ΔP_{π} ± 61	54	64	87	109	128	140	145	147	150	156	155	159	154	141	117	86	121
IV ΔP_{π} ± 21	33	33	46	74	118	156	167	152	134	100	77	64	57	76	119	151	93
V ΔP_{π} ± 135	114	93	93	107	111	113	107	88	75	83	108	143	179	205	198	182	126
Mittel ± 53	56	62	79	102	125	144	151	147	143	138	137	137	134	129	118	100	115
II $\Delta \bar{P}_{\pi}$ ± 13	19	26	36	34	39	42	42	41	37	34	36	41	37	28	17	7	31
III $\Delta \bar{P}_{\pi}$ ± 8	14	21	30	43	59	66	71	66	62	63	61	57	51	42	32	19	45
IV $\Delta \bar{P}_{\pi}$ ± 27	34	33	39	45	49	50	48	45	43	42	46	50	55	57	54	39	44
V $\Delta \bar{P}_{\pi}$ ± 19	32	35	25	27	41	59	65	60	47	40	38	31	20	22	49	70	40
VI $\Delta \bar{P}_{\pi}$ ± 47	32	24	29	34	40	45	44	37	36	40	49	57	72	70	50	24	43
Mittel ± 23	26	28	31	37	46	52	54	50	45	44	46	47	47	44	40	32	41
I $\Delta\lambda$ = ± 81	99	111	146	149	123	84	52	59	79	82	59	55	118	162	176	175	107
II $\Delta\lambda$ = ± 76	121	157	192	178	122	79	65	66	82	96	83	76	113	148	158	153	116
III $\Delta\lambda$ = ± 145	139	162	204	219	203	159	151	144	144	149	150	142	187	234	265	295	182
IV $\Delta\lambda$ = ± 161	156	187	192	169	117	94	112	120	121	116	116	131	146	195	274	348	162
V $\Delta\lambda$ = ± 111	85	130	226	282	246	152	141	177	255	260	220	197	192	245	232	140	194
VI $\Delta\lambda$ = ± 96	149	131	178	146	98	97	127	193	273	300	395	379	262	231	181	134	201
Mittel ± 112	125	155	190	190	151	111	108	126	159	167	170	163	171	202	214	207	160
I Δy = ± 97	127	157	171	178	181	188	194	194	191	192	211	230	230	216	202	187	185
II Δy = ± 82	132	170	191	197	200	205	209	206	202	193	198	198	196	191	174	155	182
III Δy = ± 144	153	190	235	281	326	353	365	348	323	308	298	285	285	295	307	306	282
IV Δy = ± 166	180	216	246	262	266	262	253	247	234	224	223	243	274	307	341	370	254
V Δy = ± 116	114	124	144	161	179	202	213	212	202	189	165	135	94	58	40	48	141
VI Δy = ± 88	98	123	147	164	176	183	181	170	161	157	178	208	235	241	206	121	167
Mittel ± 116	134	163	189	207	221	232	236	230	219	210	213	216	219	218	212	198	202
I Δz = ± 101	147	178	206	231	249	267	281	275	262	297	342	360	324	244	155	72	234
II Δz = ± 91	133	186	218	260	301	325	328	320	288	260	282	310	279	207	128	56	239
III Δz = ± 62	113	162	230	322	432	513	543	514	505	507	499	463	408	333	249	146	354
IV Δz = ± 197	239	238	288	339	373	383	378	349	380	340	359	393	421	429	395	289	340
V Δz = ± 127	216	234	174	203	312	445	495	457	363	296	273	216	136	179	369	516	295
VI Δz = ± 360	260	196	225	264	298	335	327	275	261	289	360	433	542	539	400	213	328
Mittel ± 156	185	198	224	269	328	378	391	365	344	331	353	362	352	323	285	215	257

mittel = average

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TABLE (50) continuation m

	φ=+90°	+70°	+60°	+50°	+40°	+30°	+20°	+10°	0°	-10°	-20°	-30°	-40°	-50°	-60°	-70°	-80°	Mitt.
I aδ =				±3,05	2,47	2,17	2,05	2,01	2,00	2,08	2,29	2,76	3,27	3,78				2,54
II aδ =				±3,44	2,95	2,49	2,25	2,15	2,11	2,15	2,28	2,55	2,82	3,09				2,59
III aδ =				±4,66	3,84	4,09	3,95	3,83	3,67	3,57	3,65	3,82	4,14	5,12				4,03
IV aδ =				±5,14	4,04	3,36	2,94	2,71	2,65	2,60	2,73	3,00	3,70	4,86				3,43
V aδ =				±2,28	2,00	2,06	2,16	2,25	2,38	2,35	2,45	2,24	1,91	1,58				2,14
VI aδ =				±2,99	2,50	2,24	2,04	1,94	1,84	1,97	2,27	2,87	3,40	3,75				2,53
Mittel				±3,63	2,97	2,73	2,56	2,49	2,43	2,45	2,61	2,87	3,21	3,70				2,88
I ai = ± 0,57	0,68	0,87	1,09	1,34	1,70	2,17	2,64	2,75	2,57	2,04	1,79	1,68	1,57	1,37	1,13	0,92	1,57	
II ai = ± 0,50	0,78	1,03	1,35	1,61	2,00	2,44	2,93	3,13	2,86	2,25	1,66	1,52	1,42	1,22	0,97	0,77	1,65	
III ai = ± 0,78	0,79	1,05	1,53	2,22	3,10	4,07	4,98	5,27	4,74	3,79	2,96	2,35	1,94	1,64	1,40	1,25	2,58	
IV ai = ± 1,13	0,86	1,11	1,50	1,86	2,29	2,79	3,30	3,55	3,35	2,81	2,26	1,88	1,57	1,46	1,58	2,69	2,12	
V ai = ± 0,53	0,74	0,90	1,34	2,16	3,13	4,12	4,82	4,88	4,36	3,51	2,58	1,84	1,28	0,96	0,37	0,64	2,24	
VI ai = ± 0,57	0,72	0,97	1,21	1,48	1,91	2,46	2,87	2,98	2,65	2,75	2,77	2,88	2,71	2,02	1,48	0,79	1,93	
Mittel ± 0,68	0,76	0,99	1,34	1,78	2,35	3,01	3,51	3,68	3,40	2,86	2,34	2,02	1,75	1,44	1,15	1,18	2,02	
I aT = ± 94	105	124	155	155	128	88	63	69	79	78	54	51	112	155	169	164	108	
II aT = ± 85	119	147	184	175	118	87	75	80	94	100	86	73	113	143	149	137	116	
III aT = ± 132	123	157	198	213	197	154	143	139	133	132	128	129	167	195	210	214	163	
IV aT = ± 170	105	141	163	148	99	78	99	107	107	99	105	121	129	130	175	432	142	
V aT = ± 86	124	145	236	290	253	156	139	183	250	259	218	193	191	223	160	98	189	
VI aT = ± 127	146	170	169	138	92	86	119	190	265	286	368	342	257	248	230	122	197	
Mittel ± 116	120	147	184	186	148	108	106	128	155	159	160	151	162	182	182	194	152	
I aJ = ± 96	144	166	178	178	168	144	110	79	138	218	272	291	254	187	118	56	165	
II aJ = ± 91	126	154	180	186	196	185	147	93	102	162	224	244	216	160	97	43	154	
III aJ = ± 54	97	134	174	212	238	237	190	145	230	305	347	346	322	274	210	122	214	
IV aJ = ± 181	220	211	229	245	242	205	144	103	141	209	266	329	368	383	340	228	238	
V aJ = ± 123	215	252	214	147	122	130	129	135	160	186	195	163	130	253	402	509	204	
VI aJ = ± 373	281	189	190	209	266	201	183	196	245	312	353	438	516	490	352	183	290	
Mittel ± 153	181	186	194	196	195	184	151	125	169	232	276	302	301	291	253	191	211	

TABLE (51). M.

	φ=+90°	+70°	+60°	+50°	+40°	+30°	+20°	+10°	0°	-10°	-20°	-30°	-40°	-50°	-60°	-70°	-80°	Mittel
IIaT=	+22	+18	+6	+8	+4	+4	+4	0	-2	-4	-8	-8	-4	-8	-2	+2	+6	+2
IIIaT=	0	+4	+8	+8	+6	0	-4	-2	-6	-6	-4	-4	-2	0	+4	+12	+20	+2
IVaT=	-61	-51	-37	-31	-24	-21	-17	-10	+1	+10	+12	+16	+16	+31	+47	+69	+84	+2
VaT=	+3	-3	-5	+7	+24	+37	+45	+32	+16	0	0	-5	-11	-39	-76	-119	-151	-14
VIaT=	-135	-114	-88	-68	-61	-49	-56	-58	-60	-44	-9	+53	+121	+179	+208	+198	+182	+12
Mittel	-34	-29	-23	-15	-10	-6	-6	-8	-10	-9	-2	+10	+24	+33	+36	+32	+28	+1
IaF=	-10	-7	-2	0	-1	-1	0	0	+1	+2	+3	+2	+2	+1	0	-3	-5	-1
IIaF=	+4	+1	-2	-5	-3	+2	-1	+2	+1	+1	+1	+2	+3	+2	-3	-8	-13	-1
IIIaF=	+24	+15	+7	+4	+4	+6	+6	+2	-2	-5	-4	0	+1	-2	-12	-24	-35	-1
IVaF=	-4	+7	+13	+8	-5	-18	-21	-13	0	+5	+2	-6	-8	+1	+22	+49	+70	+6
VaF=	+57	+32	+17	+6	+2	+4	+9	+18	+28	+31	+19	-8	-44	-69	-69	-48	-19	-3
Mittel	+12	+60	+7	+3	-7	-1	-1	+2	+6	+7	+4	-2	-9	-13	-12	-7	0	0
IaX=	+20	+26	+26	+16	+10	+8	+10	+14	+12	+8	+6	+2	-4	-12	-18	-18	-14	+5
IIaX=	+21	+34	+28	+20	+14	+9	+12	+16	+12	+8	+4	+4	-6	-12	-20	-22	-13	+6
IIIaX=	-18	-24	-15	-2	+12	+21	+14	+4	0	+4	+2	+2	-8	-29	-44	-49	-31	-9
IVaX=	-51	-74	-65	-34	-16	-23	-41	-57	-55	-35	-11	-13	-41	-82	-115	-111	-69	-53
VaX=	+45	+35	-23	-95	-112	-56	+31	+93	+96	+52	+11	+17	+89	+182	+245	+232	+140	+58
VIaX=	-91	-133	-132	-89	-39	-5	+23	+19	-35	-148	-293	-395	-379	-241	-44	+97	+185	-105
Mittel	-12	-23	-30	-31	-22	-8	+8	+15	+5	-18	-47	-64	-58	-32	+1	+21	+20	-16

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$M = \Delta y$ = to zero for each parallel circle
mittel = average

TABLE (51) continuation M.

	φ=+80°	+70°	+60°	+50°	+40°	+30°	+20°	+10°	0°	-10°	-20°	-30°	-40°	-50°	-60°	-70°	-80°	Mittel
IaZ=	+62	+38	+7	+6	+2	+2	+6	-2	-6	-10	-14	-12	-14	-12	-2	+14	+30	+6
IIaZ=	+76	+50	+20	+8	+6	+6	+4	0	-10	-16	-20	-18	-18	-12	0	+18	+36	+8
IIIaZ=	-26	-2	+18	+32	+20	+4	-8	-12	-10	-8	-8	-16	-20	-12	+14	+54	+90	+6
IVaZ=	-180	-124	-64	-39	-36	-50	-48	-21	+19	+34	+30	+10	-1	+29	+99	+189	+262	+6
VaZ=	+26	-43	-85	-48	+44	+134	+155	+95	+11	-31	-13	+34	+47	-26	-179	-369	-516	-45
VIaZ=	-360	-260	-154	-74	-42	-50	-86	-142	-204	-216	-128	+77	+335	+520	+539	+400	+211	+22
Mittel	-67	-57	-38	-19	0	+8	+4	-14	-33	-41	-25	+12	+55	+81	+78	+51	+19	0
Iaδ=				+0,06	+0,11	+0,13	+0,13	+0,13	+0,10	+0,07	+0,01	-0,03	-0,01	+0,02				+0,07
IIaδ=				+0,41	+0,36	+0,30	+0,27	+0,21	+0,17	+0,12	+0,05	0,00	+0,01	+0,08				+0,18
IIIaδ=				+0,72	+0,13	+0,39	+0,26	+0,15	+0,13	+0,13	+0,21	+0,30	+0,36	+0,35				+0,28
IVaδ=				+1,30	+0,76	+0,41	+0,21	+0,10	+0,03	+0,03	+0,10	+0,28	+0,55	+0,78				+0,41
Vaδ=				-0,28	-0,57	-0,35	-0,18	-0,02	+0,14	+0,32	+0,52	+0,65	+0,58	+0,38				+0,05
VIaδ=				-0,59	-0,26	-0,06	+0,05	+0,10	+0,07	+0,04	+0,04	+0,24	+0,79	+1,57				+0,18
Mittel				+0,17	+0,05	+0,14	+0,12	+0,11	+0,11	+0,12	+0,15	+0,24	+0,38	+0,53				+0,20
Iaι=	+0,48	+0,24	+0,22	+0,22	+0,18	+0,10	+0,05	-0,01	+0,06	+0,07	+0,05	-0,01	-0,09	-0,16	-0,16	-0,12	-0,08	+0,06
IIaι=	+0,15	+0,01	+0,05	+0,09	0,00	-0,08	-0,15	-0,16	-0,14	-0,11	-0,07	0,00	-0,03	-0,02	-0,03	+0,03	+0,22	-0,01
IIIaι=	-0,78	-0,28	-0,21	-0,12	-0,11	-0,12	-0,11	-0,07	+0,03	+0,16	+0,19	+0,14	+0,10	+0,07	+0,13	+0,26	+0,92	+0,01
IVaι=	-0,59	-0,17	-0,04	-0,15	-0,34	-0,51	-0,52	-0,31	+0,17	+0,59	+0,73	+0,58	+0,38	+0,37	+0,57	+1,16	+2,65	+0,27
Vaι=	-0,25	-0,39	-0,23	+0,18	+0,62	+0,96	+1,00	+0,61	+0,04	-0,20	+0,04	+0,51	+0,99	+1,16	+0,96	+0,33	-0,64	+0,33
VIaι=	+0,54	+0,58	+0,56	+0,37	+0,16	-0,06	-0,47	-1,03	-1,25	-1,99	-1,78	-1,03	-0,20	+0,57	+1,08	+1,15	+0,77	-0,13
Mittel	-0,08	0,00	+0,06	+0,10	+0,08	+0,05	-0,03	-0,16	-0,19	-0,25	-0,14	+0,02	+0,19	+0,33	+0,42	+0,47	+0,65	+0,09
IaT=	-76	-26	-14	-13	-8	0	+6	+13	+13	+11	+10	+5	-2	-12	-20	-21	-17	-9
IIaT=	-19	+11	+9	+6	+5	+2	+8	+10	+7	+4	+3	+6	-1	-3	-8	-3	+34	+4
IIIaT=	+132	+41	+27	+19	+21	+21	+11	+1	-1	+6	+7	+11	+9	-2	0	+24	+157	+28
IVaT=	+76	+1	-13	+2	+11	-1	-24	-42	-40	-17	+10	+15	0	-15	-1	+108	+432	+30
VaT=	+49	+56	-1	-75	-98	-50	+31	+92	+94	+50	+13	+21	+93	+180	+223	+160	-14	+48
VIaT=	-127	-137	-131	-87	-40	-8	+17	+12	-39	-146	-279	-368	-342	-204	-19	+102	+100	-100
Mittel	+6	-9	-20	-25	-18	-6	+8	+14	+6	-15	-39	-52	-40	-9	+29	+62	+115	0
Iaλ=	+56	+29	+9	-1	+1	+11	+24	+28	+27	+24	+25	+18	+11	+5	-7	-29	-34	+12
IIaλ=	+74	+50	+22	+16	+20	+24	+24	+17	+6	+6	+14	+20	+18	+12	0	-16	-30	+16
IIIaλ=	-15	+10	+29	+40	+30	+21	+13	+16	+27	+37	+32	+34	+30	+18	-9	-40	-71	+12
IVaλ=	-170	-120	-58	-20	-3	-10	-13	-5	+9	+18	+29	+30	+21	-14	-73	-137	-184	-41
Vaλ=	+31	-32	-83	-81	-31	+41	+82	+87	+75	+55	+28	+8	+30	+116	+253	+402	+509	+88
VIaλ=	-373	-281	-186	-108	-69	-61	-62	-59	-59	-71	-136	-266	-419	-516	-490	-350	-183	-217
Mittel	-66	-57	-44	-26	-9	+4	+11	+14	+14	+11	-1	-26	-51	-63	-54	-27	+1	-22

mittel = average

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TABLE (52). III.

$\lambda =$	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°	Mittel
IIaT	± 50	32	100	159	178	148	96	64	62	70	59	41	35	37	33	25	58	75	85	109	148	178	167	116	88
IIIaT	± 38	110	207	256	233	174	124	107	104	92	80	80	79	62	46	63	126	188	232	295	296	247	174	95	147
IVaT	± 93	131	174	183	155	113	73	67	60	54	67	90	96	80	47	32	61	115	176	228	251	234	189	128	121
VaT	± 179	199	161	93	43	61	75	85	88	83	79	81	85	88	82	70	66	76	96	106	102	75	57	112	93
VIaT	± 188	156	108	64	69	86	95	98	93	87	77	69	89	104	110	124	120	140	165	185	197	200	199	197	126
Mittel	± 108	126	150	151	136	116	93	84	81	77	72	72	77	74	64	61	86	113	155	185	199	187	157	130	115
IIaF	± 17	12	36	60	67	46	24	23	23	32	26	14	8	24	27	15	24	24	23	16	40	62	61	41	31
IIIaF	± 18	34	73	91	69	34	33	40	41	40	29	22	31	33	21	18	27	42	66	87	88	67	44	31	44
IVaF	± 38	58	73	70	49	23	33	41	39	29	25	34	39	34	26	14	11	21	48	74	88	84	69	50	45
VaF	± 70	75	52	21	25	31	31	33	34	31	28	30	38	45	45	39	31	32	39	48	53	50	36	46	40
VIaF	± 60	46	30	25	34	43	48	50	45	37	25	17	26	33	33	30	29	36	50	61	70	72	68	65	43
Mittel	± 41	45	53	53	49	35	34	37	36	34	27	23	28	34	30	23	24	31	45	57	68	67	56	47	41
IaX	± 97	47	93	145	184	175	163	149	148	139	103	54	29	70	95	84	76	62	61	70	101	143	155	134	107
IIaX	± 66	63	119	182	200	177	154	123	108	120	108	69	59	106	148	78	76	102	100	109	139	157	147	103	116
IIIaX	± 76	139	268	329	288	201	180	205	209	193	142	75	116	138	121	101	108	156	227	256	298	249	172	95	182
IVaX	± 146	149	183	203	170	141	170	188	177	151	145	157	178	172	137	85	67	95	146	206	237	223	195	162	162
VaX	± 306	313	235	122	102	153	184	201	204	195	182	187	203	220	208	185	166	150	160	177	187	183	185	242	194
VIaX	± 234	295	168	160	185	216	247	256	233	191	139	105	107	119	139	138	161	206	255	286	281	282	271	265	201
Mittel	± 154	153	174	190	188	177	183	187	180	165	136	108	116	137	133	112	109	128	158	189	207	207	188	162	160
IaY	± 310	388	412	314	121	148	205	176	143	161	197	180	184	155	59	141	179	143	92	120	205	203	59	168	324	182
IIaY	± 384	396	360	218	31	247	256	138	109	43	105	138	156	39	141	179	143	92	120	205	203	59	168	324	182
IIIaY	± 516	567	426	159	299	331	191	52	61	124	187	243	161	253	352	366	342	328	270	150	147	335	406	446	280
IVaY	± 483	409	260	206	307	322	250	141	94	133	173	158	119	179	244	270	302	336	341	239	96	208	364	460	254
VaY	± 257	95	269	317	230	129	74	41	19	49	49	49	61	64	82	104	138	161	127	77	78	187	339	390	141
VIaY	± 215	225	269	257	181	96	40	37	58	137	161	158	115	56	79	131	171	176	156	122	211	327	332	257	167
Mittel	± 362	347	332	245	205	212	169	97	88	108	145	154	133	134	163	190	194	193	185	171	169	216	278	345	202
IaZ	± 263	96	141	372	494	440	302	230	252	251	201	160	136	104	155	133	124	108	137	109	199	390	455	391	235
IIaZ	± 133	88	275	461	508	362	188	161	175	238	191	102	64	169	186	102	170	179	196	140	324	479	469	317	234
IIIaZ	± 129	267	563	696	546	283	256	292	304	292	223	176	234	240	172	139	229	360	538	693	699	548	362	239	353
IVaZ	± 289	430	548	530	387	202	231	286	270	192	181	256	291	250	186	102	86	193	389	582	677	695	530	379	338
VaZ	± 518	566	407	166	148	222	230	250	256	230	209	227	281	320	323	277	228	232	291	294	381	353	248	335	292
VIaZ	± 468	368	226	184	248	313	349	358	323	270	196	141	208	243	246	229	227	287	393	475	536	547	527	507	328
Mittel	± 304	302	360	401	392	364	259	263	264	245	200	177	201	221	211	164	177	226	312	382	467	434	432	361	297
Iad	± 4,50	6,07	6,66	4,79	1,41	2,25	3,11	2,47	1,87	2,29	2,59	2,05	2,01	1,61	0,51	0,95	0,83	0,67	0,99	3,21	4,15	2,60	0,75	2,68	2,54
IIad	± 5,93	6,19	5,81	3,25	1,12	3,54	3,83	1,67	1,31	0,40	1,22	1,80	2,03	1,12	1,93	2,69	2,00	0,89	1,91	2,66	2,81	0,85	2,74	5,05	2,59
IIIad	± 3,29	9,12	6,46	3,08	4,59	5,15	3,09	0,97	0,74	1,60	2,49	3,02	2,24	3,42	4,08	4,50	4,42	4,55	3,83	1,94	2,73	5,42	6,23	6,75	4,07
IVad	± 2,86	4,52	3,68	2,62	3,63	3,82	2,74	1,38	1,32	2,06	2,33	1,84	1,35	1,90	2,72	2,97	3,50	4,32	4,31	2,66	1,12	3,78	6,22	7,66	3,43
Vad	± 3,94	2,28	3,98	5,18	4,01	2,25	1,25	0,63	0,25	0,81	0,73	0,65	0,73	0,61	0,66	1,04	1,64	1,95	1,37	0,69	1,34	3,38	5,71	6,28	2,14
VIad	± 4,38	4,11	3,96	3,17	1,79	0,99	0,96	0,92	1,26	1,44	1,79	1,91	1,94	0,75	1,09	1,85	2,42	2,50	2,19	2,36	3,40	5,23	5,64	5,13	2,53
Mittel	± 3,82	5,73	5,09	3,67	2,76	3,00	2,50	1,34	1,12	1,43	1,88	1,83	1,63	1,40	1,83	2,33	2,67	2,78	2,12	2,25	2,59	3,54	4,55	5,59	2,88

mittel = average

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TABLE (52).. con'd. in.

	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°	Mittel
Iai = ± 1,08	0,82	1,20	1,08	1,86	1,19	1,91	1,14	1,08	0,97	0,99	1,25	1,02	0,70	0,95	0,61	0,63	0,46	0,51	0,64	1,41	2,87	3,43	3,02	1,57
IIai = ± 0,82	0,77	2,34	3,72	3,99	2,73	1,14	0,86	0,56	0,93	0,67	0,38	0,61	1,40	1,49	0,63	1,34	1,52	1,16	1,36	2,47	3,47	3,39	2,22	1,67
IIIai = ± 0,81	2,41	5,33	6,45	4,91	2,09	1,15	1,36	1,34	1,34	0,98	0,76	1,97	2,34	1,69	0,93	1,36	2,26	3,57	4,82	5,11	4,18	2,87	1,90	2,58
IVai = ± 0,95	2,63	3,90	3,84	2,63	1,03	1,00	1,38	1,28	0,78	1,04	1,81	2,09	1,73	1,18	0,71	0,67	1,52	2,74	3,93	4,49	4,18	3,29	2,05	2,12
Vai = ± 5,62	6,11	4,19	1,40	0,91	1,65	1,83	1,96	2,01	1,82	1,52	1,52	1,77	1,83	1,54	1,19	1,34	1,68	2,01	2,25	2,38	2,32	1,78	1,23	2,24
VIai = ± 4,25	3,58	2,14	1,34	1,45	1,68	1,71	1,71	1,73	1,62	1,13	0,55	0,88	1,22	1,23	1,16	1,03	1,26	1,93	2,56	2,80	2,72	2,95	1,86	1,95
Mittel ± 2,42	2,71	3,18	3,31	2,99	2,06	1,46	1,41	1,33	1,24	1,05	1,04	1,39	1,54	1,35	0,87	1,07	1,44	1,99	2,59	3,11	3,29	2,95	2,71	2,02
Ia? ± 71	63	91	147	155	141	127	137	154	157	133	98	78	94	112	88	81	60	58	85	120	147	131	99	108
IIa? ± 70	61	110	160	181	176	130	111	106	122	114	67	54	101	108	79	84	116	128	148	176	158	126	89	116
IIIa? ± 71	134	223	257	219	128	134	165	184	185	135	63	142	197	188	140	122	155	218	256	234	172	108	81	163
IVa? ± 84	115	143	148	118	86	109	134	140	132	137	148	154	160	145	108	86	148	201	226	217	191	154	117	142
Va? ± 307	301	238	113	68	117	155	178	186	184	173	175	195	212	207	192	175	166	181	187	178	184	207	265	190
VIa? ± 175	182	178	176	199	219	230	238	224	195	142	139	121	120	139	154	176	219	261	277	287	283	231	184	197
Mittel ± 138	143	160	168	157	145	146	160	166	162	139	112	124	147	130	127	121	144	174	197	202	189	160	139	151
Ia? ± 147	63	89	195	267	253	208	204	255	263	206	103	73	99	135	136	120	109	116	98	135	219	249	218	165
IIa? ± 110	65	143	239	273	220	163	158	187	236	204	107	34	89	104	94	88	78	85	88	182	234	278	205	154
IIIa? ± 102	137	220	249	208	195	246	286	303	278	215	147	126	135	134	140	172	236	312	365	345	271	182	136	214
IVa? ± 267	299	322	299	235	168	217	255	240	194	163	168	195	193	159	93	61	107	222	339	416	428	372	291	238
Va? ± 174	144	116	105	121	125	159	182	182	174	183	209	257	295	320	291	222	155	200	260	281	274	246	213	204
VIa? ± 225	171	147	182	238	299	342	346	308	234	171	178	203	210	215	216	238	294	376	462	529	543	483	346	290
Mittel ± 171	147	173	212	221	210	221	237	246	230	190	152	148	172	178	163	150	163	218	269	315	335	302	235	211

TABLE (51). Al.

	λ=0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°	Mittel
IaP =	+50	-24	-98	-158	-176	-195	-91	-52	-38	-39	-33	-24	-26	-29	-16	+20	+57	+75	+85	+103	+148	+178	+147	+117	+2
IIaP =	+3	-106	-207	-236	-233	-174	-124	-104	-100	-90	-80	-80	-79	-56	-3	+63	+126	+188	+252	+295	+296	+297	+174	+95	+2
IIIaP =	0	-85	-197	-168	-199	-109	-71	-66	-35	-43	-66	-90	-95	-76	-37	+6	+54	+109	+169	+218	+239	+218	+165	+98	+2
IVaP =	-174	-196	-161	-93	-33	+6	+23	+36	+36	+29	+19	+15	+12	+7	-6	-8	+6	+32	+55	+67	+64	+39	-21	-102	-14
VaP =	-127	-105	-58	-4	+36	+59	+67	+70	+67	+60	+43	+19	-4	-15	-11	+6	+32	+63	+87	+91	+64	+7	-60	-111	+12
Mittel	-58	-103	-134	-136	-111	-73	-39	-19	-14	-17	-23	-32	-38	-34	-15	+17	+55	+93	+130	+156	+162	+138	+85	+17	+1
IaF =	-17	+7	+34	+58	+69	+41	+8	-10	-6	+1	+1	-3	+4	+15	+16	+2	-11	-9	-3	-12	-40	-62	-61	-41	-1
IIaF =	-9	+27	+70	+90	+68	+29	+6	+9	+18	+19	+16	+22	+31	+28	+8	-11	-27	-42	-66	-87	-88	-67	-43	-28	-1
IIIaF =	+5	+36	+58	+60	+43	+20	+3	-6	-2	-3	+12	+28	+37	+32	+19	+7	-2	-18	-43	-68	-79	-73	-53	-26	-1
IVaF =	+59	+70	+50	+18	-4	-10	-9	-9	-8	-3	+9	+6	+6	+10	+18	+23	+16	0	-15	-25	-31	-31	-13	+23	+6
VaF =	+51	+38	+16	-8	-24	-27	-26	-23	-22	-17	-8	+5	+16	+21	+20	+13	+1	-17	-34	-44	-37	-13	+18	+43	+5
Mittel	+18	+36	+46	+44	+23	+11	-4	-8	-5	-1	+5	+12	+19	+21	+16	+7	-5	-17	-32	-47	-55	-43	-10	-6	0
Ia =	+1	+3	+7	+11	+13	+17	+18	+18	+18	+16	+16	+13	+9	+6	+2	-1	-3	-6	-6	-6	-6	-4	-3	-2	+5
IIa =	+1	+4	+5	+6	+11	+13	+14	+15	+14	+14	+14	+12	+11	+2	+6	+7	+2	+1	+1	-1	-2	-3	-3	+1	+6
IIIa =	-3	-10	-8	-6	-5	-3	-2	-1	-2	0	-3	-4	-5	-7	-9	-12	-12	-15	-16	-18	-18	-19	-17	-16	-9
IVa =	-74	-71	-64	-60	-53	-47	-40	-36	-32	-29	-28	-28	-32	-36	-41	-46	-51	-57	-63	-68	-73	-76	-77	-76	-52
Va =	+63	+62	+59	+57	+54	+52	+51	+51	+50	+49	+50	+50	+52	+53	+56	+58	+59	+62	+64	+66	+67	+67	+67	+64	+58
VIa =	-107	-106	-106	-104	-102	-100	-101	-101	-100	-102	-103	-105	-103	-102	-103	-105	-107	-108	-109	-109	-110	-108	-109	-106	-105
Mittel	-21	-28	-18	-16	-14	-11	-10	-9	-9	-9	-9	-10	-11	-13	-15	-16	-19	-20	-21	-23	-24	-24	-24	-22	-16

mittel = average

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TABLE (51). M.

λ =	0°	15°	30°	45°	60°	75°	90°	105°	120°	135°	150°	165°	180°	195°	210°	225°	240°	255°	270°	285°	300°	315°	330°	345°	Mittel
T_{a0} =	+307	+336	+407	+305	+92	-116	-201	-176	-145	-156	-155	-83	+17	+55	+22	-6	+11	+6	-89	-231	-282	-176	+18	+190	0
I_{a0} =	+38	+396	+360	+212	-30	-229	-252	-136	-34	-25	-45	-19	+21	-16	-118	-174	-132	-75	-112	-205	-209	-53	+168	+324	0
II_{a0} =	+526	+567	+426	+110	-179	-252	-193	-35	-30	-69	-[illegible]	-57	-123	-253	-352	-366	-342	-328	-270	-101	+197	+335	+406	+446	0
III_{a0} =	+[illegible]	+[illegible]	+232	+19	-137	-185	-151	-84	-9	+67	+108	+70	-45	-166	-236	-262	-293	-324	-320	-199	0	+208	+364	+460	0
IV_{a0} =	+253	-9	-231	-293	-216	-120	-68	-34	+11	+43	+43	+30	+35	+54	+32	-31	-126	-158	-122	-52	+44	+183	+336	+387	0
V_{a0} =	-5	-178	-268	-257	-181	-90	-24	+15	+53	+101	+142	+144	+28	+22	-58	-124	-169	-174	-167	+35	+246	+330	+315	+187	0
Mittel	+325	+262	+154	+16	-108	-165	-140	-75	-26	-5	+5	+14	0	-51	-117	-162	-175	-175	-170	-121	-16	+136	+268	+332	0
I_{a2} =	+203	+95	-130	-358	-472	-405	-236	-107	-61	-24	+64	+142	+130	+67	-6	0	0	-60	-110	-31	+178	+384	+455	+391	+6
II_{a2} =	+129	-56	-263	-451	-493	-332	-95	+38	+20	-25	-20	+7	-35	-110	-186	+1	+98	+95	+61	+134	+324	+477	+463	+317	+8
III_{a2} =	+60	-225	-548	-691	-546	-270	-101	-108	-166	-164	-142	-176	-234	-208	-69	+100	+229	+360	+538	+693	+699	+598	+362	+223	+7
IV_{a2} =	-16	-272	-439	-468	-346	-184	-56	+14	+33	-3	-103	-223	-240	-238	-138	-44	+91	+169	+356	+537	+620	+567	+418	+213	+6
V_{a2} =	-158	-541	-399	-160	+12	+66	+69	+75	+73	+34	-13	-30	-28	-56	-118	-149	-156	+17	+121	+189	+227	+211	+70	-197	-47
VI_{a2} =	-378	-236	-127	+48	+162	+203	+195	+180	+167	+139	+73	-31	-102	-137	-132	-76	+11	+115	+252	+323	+267	+88	-143	-323	+22
Mittel	-69	-116	-318	-393	-280	-154	-37	+13	+11	-8	-23	-50	-91	-117	-94	-98	+37	+112	+204	+307	+386	+340	+272	+104	0
I_{a4} =	+9,50	+6,07	+6,66	+4,79	+1,16	-2,93	-3,11	-2,49	-1,67	-2,23	-2,49	-4,44	+0,09	+0,78	+0,23	-0,07	+0,92	+0,56	-0,88	-3,21	-4,15	-2,60	+0,22	+2,68	+0,07
II_{a4} =	+1,93	+6,89	+6,81	+2,25	-0,55	-2,54	-3,83	-2,66	+0,08	-0,06	-0,13	-0,45	+0,24	-0,36	-1,93	-2,66	-2,74	-0,61	-1,09	-2,66	-2,81	-0,52	+2,74	+5,05	+0,18
III_{a4} =	+8,23	+5,12	+6,96	+1,12	-3,44	-4,65	-2,70	-0,65	-0,36	-0,84	-1,51	+0,19	-0,59	-2,42	-4,08	-4,50	-4,92	-4,55	-3,83	-1,11	+2,73	+5,52	+6,23	+6,75	+0,32
IV_{a4} =	+7,86	+6,49	+3,68	+0,53	-1,88	-2,67	-2,17	-1,38	-0,31	+0,88	+1,71	+1,23	-0,25	-1,87	-2,72	-2,97	-3,50	-3,32	-4,31	-2,48	+0,58	+3,78	+6,82	+7,66	+0,41
V_{a4} =	+1,94	-0,32	-3,34	-5,18	-4,01	-2,25	-1,25	-0,63	+0,16	+0,81	+0,79	+0,33	+0,34	+0,61	+0,49	-0,48	-1,62	-1,95	-1,31	-0,03	+1,34	+3,31	+5,71	+6,28	+0,05
VI_{a4} =	+0,55	-2,02	-3,36	-3,08	-1,71	-0,27	+0,49	+0,63	+0,61	+0,27	+1,13	+1,19	+0,68	-0,18	-1,09	-1,85	-2,48	-2,50	-1,42	+0,86	+3,40	+5,23	+5,27	+3,36	+0,18
Mittel	+5,18	+4,27	+3,55	+0,24	-1,74	-2,35	-2,10	-1,01	-0,28	-0,12	-0,02	+0,19	+0,16	-0,57	-1,53	-2,09	-2,21	-2,13	-2,14	-1,43	+0,18	+3,45	+4,40	+5,30	+0,28
I_{a6} =	+2,04	+0,71	-1,20	-3,08	-3,86	-3,18	-1,86	-0,57	-0,73	-0,91	+0,41	+1,06	+0,31	+0,23	-0,02	+0,18	+0,58	+0,18	-0,27	+0,10	+1,91	+2,87	+3,93	+3,02	+0,06
II_{a6} =	+0,76	-0,69	-2,34	-3,78	-3,99	-2,73	-0,93	0,00	-0,21	-0,34	-0,33	-0,07	-0,45	-1,08	-1,03	+0,11	+1,30	+1,52	+1,15	+1,36	+2,97	+3,97	+3,39	+2,21	-0,02
III_{a6} =	+0,32	-2,34	-5,10	-6,45	-6,91	-5,09	-3,13	+0,27	+0,89	+0,13	+0,04	-0,73	-1,63	-1,84	-0,38	+0,22	+1,18	+2,24	+3,57	+4,82	+5,03	+4,15	+2,91	+1,74	+0,01
IV_{a6} =	-0,13	-2,14	-3,51	-3,53	-2,36	-0,80	+0,36	+0,90	+0,93	+0,43	-0,42	-1,29	-1,65	-1,22	-0,95	+0,15	+0,58	+1,38	+2,59	+3,77	+4,30	+3,94	+2,93	+1,66	+0,27
V_{a6} =	-5,36	-6,00	-6,15	-4,37	+0,65	+1,45	+1,55	+1,80	+1,25	+1,65	+1,33	+1,28	+1,46	+1,41	+1,01	+0,70	+0,86	+1,38	+1,95	+2,20	+2,34	+2,09	+0,93	-1,54	+0,33
VI_{a6} =	-1,85	-3,30	-4,78	-4,33	+0,43	+0,69	+0,59	+0,60	+0,78	+0,89	+0,56	-0,08	-0,70	-0,99	-0,88	-0,95	+0,19	+1,02	+1,90	+2,50	+2,35	+1,09	-1,27	-3,32	-0,15
Mittel	-1,06	-2,29	-3,05	-3,09	-2,33	-1,11	-0,05	+0,43	+0,65	+0,36	+0,26	+0,03	-0,34	-0,57	-0,90	+0,15	+0,77	+1,29	+1,81	+2,46	+2,99	+2,51	+1,96	+0,96	+0,08
I_{a7} =	-52	-23	+26	+77	+51	-7	-18	-2	+6	+6	+9	-6	-31	-29	-20	-25	-19	-14	-20	-20	-7	-5	-31	-54	-9
II_{a7} =	-26	+8	+54	+68	+17	-32	-19	+11	+19	+14	+10	0	-12	+4	+6	+7	+3	+2	0	+11	+24	+5	-29	-40	+4
III_{a7} =	+11	+64	+98	+53	-15	-10	+27	+35	+21	+10	+14	+29	+63	+81	+84	+75	+62	+28	+25	+24	-2	-34	-38	-23	+28
IV_{a7} =	+22	+48	+43	+17	+14	+35	+49	+46	+49	+33	+26	+30	+38	+50	+57	+61	+62	+50	+49	+26	-10	-32	-31	-11	+30
V_{a7} =	+86	+60	-12	-28	+6	+21	+21	+19	+18	+20	+18	+13	+15	+17	+30	+54	+79	+86	+49	+52	+70	+95	+138	+172	+46
VI_{a7} =	-99	-138	-195	-139	-129	-121	-115	-106	-95	-94	-116	-129	-121	-100	-80	-63	-49	-46	-64	-91	-115	-105	-76	-67	-100
Mittel	-10	+3	+11	+9	-9	-19	-9	0	+1	-2	-6	-10	-8	+4	+13	+18	+23	+18	+6	0	-7	-13	-11	-4	0
I_{a5} =	-10	+25	+32	+47	+73	+116	+155	+206	+255	+263	+206	+103	-5	-94	-135	-136	-120	-95	-77	-86	-115	-131	-114	-65	+12
II_{a5} =	-25	-16	-27	-32	-11	+8	+32	+97	+187	+236	+204	+107	-3	-80	-98	-70	-29	+14	+42	+31	-11	-52	-66	-50	+16
III_{a5} =	-76	-89	-82	-5	+104	+185	+232	+263	+263	+212	+131	+24	-81	-130	-98	-36	+8	+6	-33	-82	-114	-123	-111	-86	+12
IV_{a5} =	-267	-242	-172	-76	+20	+115	+203	+252	+240	+185	+114	+35	-38	-76	-65	-20	+9	-21	-95	-167	-204	-221	-239	-241	-41
V_{a5} =	+45	+53	+54	+35	+31	+53	+88	+107	+102	+35	+72	+80	+105	+121	+111	+83	+68	+85	+115	+133	+148	+143	+113	+68	+88
VI_{a5} =	-190	-80	-44	-54	-72	-73	-62	-55	-62	-96	-138	-178	-203	-218	-209	-211	-236	-293	-376	-496	-529	-533	-433	-346	-217
Mittel	-87	-58	-40	-15	+24	+67	+108	+145	+164	+147	+98	+28	-38	-78	-82	-65	-50	-51	-71	-105	-137	-154	-150	-123	-28

mittel = average

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The absolute positive and negative maxima of the yearly secular changes $\Delta P, \Delta F, \Delta X, \Delta Y, \Delta Z, \Delta\delta, \Delta i, \Delta T, \Delta J$ of the nine Earth magnetic elements $P, F, X, Y, Z, \delta, i, T, J$ are taken from the nine tables (41)-(49) above and are entered into the following tables (54), (55), (56), (57), (58), (59), (60), (61) and (62). All values of Tables (41)-(49) were considered. When setting up Table (59), only the area between the parallels $\varphi = +50°$ and $\varphi = -50°$ were considered. $\Delta P, \Delta F, \Delta X, \Delta Y, \Delta Z, \Delta T$ and ΔJ are also given in Tables (54)-(62), as before in (41)-(53) in Gauss units of the 5th decimal. $\Delta\delta$ and Δi are given in minutes. /59

TABLE (54).

Zeit von	φ	λ	ΔT
1550 bis 1600			
1600 bis 1650	0°	315°	+266
	+20	60	-280
1650 bis 1700	-10	300	+484
	+10	45	-492
1700 bis 1780	-40	300	+377
	0	45	-298
1780 bis 1842	+20	120	+204
	0	15	-259
1842 bis 1885	-50	285	+430
	+10	345	-330
Mittel	±16°		± 362

TABLE (55).

φ	λ	ΔF
+25°	60°	+118
-40	338	-102
+5	45	+198
-5	300	-154
-10	45	+115
-50	300	-138
0	15	+215
-30	300	-105
+15	345	+126
-50	300	-207
±23°		± 148

TABLE (56).

φ	λ	ΔX
+50°	75°	+386
-70	75	-362
+60	60	+434
-70	60	-312
+40	45	+598
-80	105	-490
-90	315	+601
-90	135	-601
+30	15	+550
-30	15	-631
-70	285	+572
-20	315	-715
±58°		±517

TABLE (57).

φ	λ	ΔY	
+10°	30°	+536	
-30	300	-416	
-50	0	+518	
0	225	-444	
+10	15	+860	
+20	75	-672	
-90	45	+601	
-80	240	-617	
-10	345	+750	
0	45	-710	
-50	330	+718	
+20	30	-465	
±31°		±603	

TABLE (58).

φ	λ	ΔZ
-40°	330°	+756
+10	60	-752
-40	330	+752
+30	60	-880
-10	300	+1216
+10	45	-1493
-50	300	+1054
-10	45	-866
-30	300	+747
0	15	-1582
-50	300	+1518
+10	345	-958
±24°		±1048

bis = to; zeit = time; mittel = average

TABLE (59).

Zeit von	φ	λ	Δδ
1550 bis 1600	+50°	30°	+7,90
	-50	165	-4,54
1600 bis 1650	+50	15	+9,26
	+50	90	-6,48
1650 bis 1700	+10	15	+10,08
	-50	150	-7,88
1700 bis 1780	+50	345	+13,26
	-50	270	-8,15
1780 bis 1842	-20	345	+9,68
	0	45	-7,61
1842 bis 1885	-40	345	+10,81
	+50	15	-6,63
Mittel	±39°		±8'68

TABLE (60).

φ	λ	Δi
0°	330°	+6,84
0	60	-7,54
0	330	+6,44
0	60	-7,66
0	300	+11,62
0	45	-15,74
-10	300	+8,31
0	30	-8,45
-30	315	+6,80
0	15	-17,63
-40	300	+8,21
0	0	-10,40
±7°		± 9'64

TABLE (61).

φ	λ	ΔT
+50°	60°	+354
-70	120	-312
+60	60	+404
+50	300	-302
+40	45	+516
-70	135	-450
-80	270	+607
+50	300	-383
+30	0	+589
-20	15	-607
-70	270	+572
-20	300	-738
±51°		1486

TABLE (62).

φ	λ	ΔJ
-30°	75°	+524
-40	330	-578
+60	120	+426
-40	330	-576
-40	120	+662
-30	300	-656
-40	105	+516
-60	315	-845
-80	300	+647
+50	210	-490
-10	105	+364
-40	300	-1232
±44°		±626

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Table (50) gives on the average a minimum of m on the parallel $\varphi = +80°$ for an average over all five or six intermediate times, more or less in the individual series as well. It gives a maximum near $\varphi = +10°$ for $\Delta P, \Delta F, \Delta y$ and Δi ; for $\Delta X, \Delta Z, \Delta T, \Delta J$;on the other hand, there are two minima in the vicinity of the parallels $\varphi = +80°$ and $\varphi = +5°$ and two maxima near $\varphi = +40°$ and $\varphi = -60°$. Finally, $m = \Delta \delta$ according to (50) is the smallest on the Equator and increases with latitude toward the poles.

/60

The values $\Delta P, \Delta F, \Delta X, \Delta Z, \Delta i, \Delta T$ and ΔJ of Table (52) have three minima in the vicinity of $\lambda = 0°, 165°$ and 230°, and three maxima at $\lambda = 45°, 240°$ and 305°. ΔT and ΔJ in addition have a 4th minimum near $\lambda = 75°$ and a 4th maximum at $\lambda = 120°$.

$\Delta \delta$ and Δy in Table (52) have three maxima at $\lambda = 0°, 165°$ and 250° and three minima at $\lambda = 120°, 190°$ and 285°.

The averages for the entire Earth according to (50) and (52) are $m = \Delta F = \pm 0{,}00041$ γ.E., $\Delta P = \pm 0{,}00115$ γ.E., $\Delta T = \pm 0{,}00153$ γ.E., $\Delta X = \pm 0{,}00160$ γ.E., $\Delta y = \pm 0{,}00202$ γ.E., $\Delta J = \pm 0{,}00211$ γ.E. and $\Delta Z = \pm 0{,}00297$ γ.E. . Out of the Earth magnetic elements F, P, T, X, y, J and Z, F changes the least with time and the vertical component Z changes the most.

As far as the value M of Tables (51) and (53) are concerned, numerically they are smaller than the corresponding m of Tables (50) and (52) because by consideration of the signs + and - part of the number is canceled. On the average for the entire Earth, M is almost equal to zero, that is, $\Delta P = +0{,}00001$ γ.E.
$\Delta X = -0{,}00016$ γ.E., $\Delta J = -0{,}00022$ γ.E., $\Delta T = \Delta F = \Delta y = \Delta Z = 0$, $\Delta \delta = +0'.20$, $\Delta i = +0'.08$.
For the series of the quantities $M = \Delta P, \Delta F, \Delta X, \Delta y, \Delta Z, \Delta \delta, \Delta i, \Delta T$ and ΔJ, which are shown as averages in the columns of Tables (51) and (53), most of them have two maxima and two minima. Inside of the individual series, the sine usually changes three times and M goes through zero three times.

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If we finally compare the nine Tables (54)-(62) with Tables (50) or with (52), we obtain the following for the entire Earth

	according to Tables (50) or (52) average M	average values of the absolute maxima m	according to table
$\Delta P =$	$\pm 0{,}00115$ g.E.	$\pm 0{,}00362$ g.E.	(54)
$\Delta F =$	$\pm 0{,}00041$ g.E.	$\pm 0{,}00148$ g.E.	(55)
$\Delta X =$	$\pm 0{,}00160$ g.E.	$\pm 0{,}00517$ g.E.	(56)
$\Delta Y =$	$\pm 0{,}00202$ g.E.	$\pm 0{,}00609$ g.E.	(57)
$\Delta Z =$	$\pm 0{,}00297$ g.E.	$\pm 0{,}01048$ g.E.	(58)
$\Delta T =$	$\pm 0{,}00153$ g.E.	$\pm 0{,}00486$ g.E.	(61)
$\Delta J =$	$\pm 0{,}00211$ g.E.	$\pm 0{,}00626$ g.E.	(62)
$\Delta\delta =$	$\pm 2'{,}88$	$\pm 8'{,}68$	(59)
$\Delta i =$	$\pm 2{,}02$	$\pm 9{,}64$	(60)

The quantities m are, therefore, three to four times as large as the corresponding values of m; only Δi deviates from this rule slightly because for Δi, this ratio is between four and five.

At the end of this paper one can find a map drawing of the agonic (?) line for epochs 1550, 1650, 1700, 1780 and 1900 which were obtained by transferring the zero lines of declination of Tables (16) and (30) (cf. top of Pages 12 and 19 of this publication) and the zero lines of Table (32) of Publication II page 47-51 on a single sheet having the form of these tables. We have left out all the numerical values of declination here. The ag lines of epoch 1600 have been left off in order not to over burden the small map because they differ only slightly from the values for 1550. Also /61 the ag lines for epochs 1842 and 1885 are not given here because they are not much different from those for epoch 1900.

From this sketch one can see that during the time period of 350 years which we considered, from 1550 to 1900, the displacements of the northwestern half of the European-Asiatic agonic (?) line as well

as the displacement of the southeastern half of the American-Atlantic agonic line were substantial in the direction from east to west and from northeast to southwest. Over the same 350 years, the motions in the southeastern half of the European-Asiatic ag line were much less and they were also much less in the northwestern part of the American-Atlantic line where the direction of motion often change, even though the position changes were primarily from east to west, and later on, from west to east.

Over the last 120 years, from 1780 to 1900, the position changes of the southeastern half of the European-Asiatic ag line and of the northwestern half of the American-Atlantic agonic line were only small. On the other hand, in the northwest half of the European-Asiatic ag line and in the southeast half of the American-Atlantic ag line, the motions were not that small in the direction from east to west. In addition to the primary motions of the agonic lines from east to west, we also find motions in the opposite directions from west to east. According to our map, they change in such a manner that it is difficult to make a forecast for the future or the past (that is, after 1900 or before 1550) for large time intervals. A continuing motion of the ag. line around the Earth is not very likely. Also, the conclusions derived from earlier investigations of pottery found in Etruscan graves (800 BC) that at that time (800 BC) the inclination needle in central Italy pointed not to the North Pole as now, but to the South Pole, is rather unlikely*. As the five tables (33) publication II pages 51-53 and Tables (17) pages 13 and 31 page 20 of the present publication show, the magnetic equator where the inclination is zero has not moved at all over the last 350 years from 1550 to 1900 on the Earth's surface. This is a case even though according to our Table (60) above, at many locations the changes in inclination over time were quite substantial at individual points near the Equator.

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*cf. Meteorological Publication February 1897 page 53.

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Chapter I

a. The influence of magnetically acting agents which are located outside of the Earth's surface. pages 1-8 Tables (1)-(9).

b. Earth magnetic elements for the epoch 1550 pg. 9-14, Tables (10)-(20).

c. Earth magnetic elements for the epoch 1900 pg. 15-23, Tables (21)-(36).

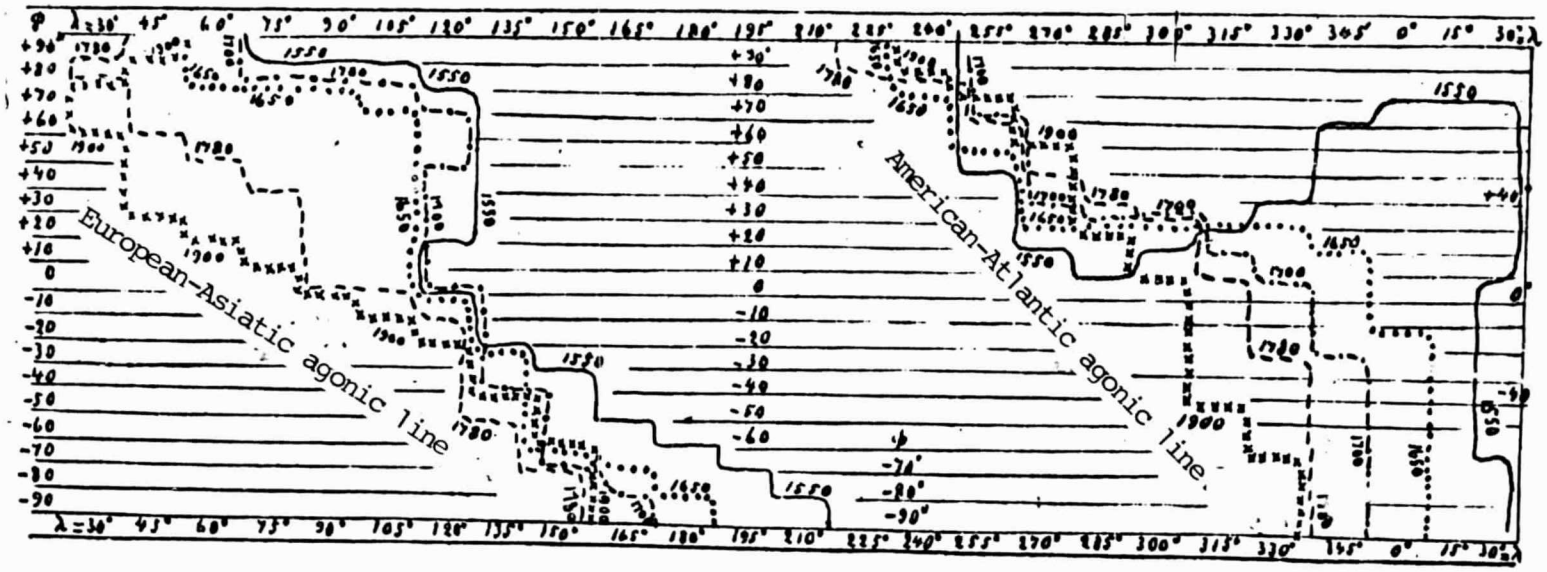
d. Earth magnetic elements for the epoch 1915 pg. 23-25, Tables (37), (38), (39).

e. Coefficients gh of the theory for 8 epochs 1550, 1600, 1650, 1700, 1790, 1842, 1885, 1900, pgs 25-26, Table (40).

Chapter II

a. Secular changes of the Earth's magnetic elements over the time between 1550-1900. Page 26-61 (Tables (41)-(62).

b. Map of the agonic lines from 1550-1900.



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The map above shows the two large agonic lines which extend from one pole to the other. Around the time of the seven epochs 1550, 1600, 1650, 1780, 1842, 1885 and 1900, there is a small closed agonic line which separates a region of positive declination from a region of negative declinations which surround it. This small region of positive declinations, according to Tables (14) and (30) and Tables (32) page 28-51 of Publication II had almost the same size and position in the years 1550, 1600 and 1650. It was almost stationary over these 100 years, approximately between the meridian $\lambda=200°$ and $\lambda=260°$ as well as between the parallels $\phi=+30°$ and $\phi=-30°$ on both sides of the Equator. Around 1700, it vanished and only occurred again during epoch 1780 between meridian $\lambda=110°$ and $140°$ and the parallels $\phi=-60°$ and $\phi=+25°$ on the northern hemisphere where it has now remained and it has expanded only very slightly through all sides.

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REMARKS

1) Table (6), page 6, $g_i$hi are the coefficients of the Gauss theory for the inner-magnetic Earth's forces.

2) λ is the eastern longitude from Greenwich and ϕ is the geographic latitude.

3) For calculating the elements, P,F,X,Y,Z,G,T and I using the Table (40) above, pages 25-26, and the element gh of the theory, one should use the formulas given in Publication I, pages 10-25.